INDEX
TO
HORTICULTURAL ABSTRACTS

Volumes XXI-XXV. 1951-1955

Compiled by

G. K. ARGLES

COMMONWEALTH BUREAU OF HORTICULTURE
AND PLANTATION CROPS

EAST MALLING, KENT, ENGLAND

August, 1956 Price 50/- or $7.

PRINTED IN GREAT BRITAIN BY HEADLEY BROTHERS LTD
109 KINGSWAY LONDON WC2 AND ASHFORD KENT

The Commonwealth Bureau of Horticulture and Plantation Crops

Its administration, links with the Commonwealth and Scientific Staff, March 1955

The Bureau is one of a group of Bureaux and Institutes covering the following subjects: agricultural parasitology, animal breeding and genetics, animal health, animal nutrition, biological control, dairying, entomology, forestry, horticulture and plantation crops, mycology, pastures and field crops, plant breeding and genetics and soil science, organized under the:

EXECUTIVE COUNCIL
COMMONWEALTH AGRICULTURAL BUREAUX

Member	*Representing*
W. F. C. MORTON (*Chairman*)	Union of South Africa
J. E. C. COVENTRY, B.A., M.Sc. (*Vice-Chairman*)	Federation of Rhodesia and Nyasaland
B. C. ENGHOLM	United Kingdom
LIEUT.-COLONEL J. G. ROBERTSON, B.S.A., F.R.S.A.	Canada
W. IVES, M.Ec.	Australia
V. ARMSTRONG, B.Sc., Ph.D., D.I.C.	New Zealand
P. N. HAKSAR, Counsellor (External Department) of the High Commissioner for India in the United Kingdom	India
A. M. CHOWDHURY	Pakistan
A. I. PERERA, C.B.E. (for H.E. THE HIGH COMMISSIONER FOR CEYLON)	Ceylon
C. E. LAMBERT, C.M.G.	Colonial Territories
SIR HERBERT HOWARD (*Secretary*) Farnham House, Farnham Royal, near Slough, Bucks.	

The Executive Council of the Commonwealth Agricultural Bureaux is a signatory to the Fair Copying Declaration, details of which can be obtained from the Royal Society, Burlington House, London, W.1.

COMMONWEALTH AGRICULTURAL BUREAUX LIAISON OFFICERS

United Kingdom:
A. B. BARTLETT, Ministry of Agriculture and Fisheries, 1/4 Cambridge Terrace, Regent's Park, London, N.W.1.

Canada:
H. L. TRUEMAN, B.S.A., Director, Administrative Services, Department of Agriculture, Ottawa, Ontario.

Australia:
G. B. GRESFORD, B.Sc., A.R.A.C.I., Commonwealth Scientific and Industrial Research Organization, 314 Albert Street, E. Melbourne, C.2, Victoria.

New Zealand:
N. A. MARRIS, M.Sc., Department of Scientific and Industrial Research, Information Bureaux, P.O. Box 8018, Government Buildings, Wellington, C.1.

Union of South Africa:
S. C. POTGIETER, c/o Secretary for Agriculture, Agriculture Buildings, P.O. Vallis, Pretoria, Transvaal.

India:
K. R. DAMLE, I.C.S., Vice-President, Indian Council of Agricultural Research, Raisina Road, New Delhi.

Pakistan:
TASKHIR AHMAD, Ph.D.(Cantab.), Director, Department of Plant Protection, Government of Pakistan, Karachi.

Ceylon:
A. J. JOSEPH, B.A.(Hons.), Assistant Secretary, Ministry of Agriculture and Food, Colombo.

Federation of Rhodesia and Nyasaland:
G. R. BATES, Ph.D.(Lond.), Chief Botanist and Plant Pathologist, Department of Research and Specialist Services, P.O. Box 8100, Causeway.

Colonies:
SIR GEOFFREY F. CLAY, K.C.M.G., O.B.E., M.C., B.Sc., N.D.A., N.D.D.(Hons.), Agricultural Adviser to the Secretary of State, Colonial Office, Sanctuary Buildings, Great Smith Street, London, S.W.1.

Sudan:
THE CHIEF OF THE RESEARCH DIVISION, Ministry of Agriculture, Wad Medani.

Republic of Ireland:
S. M. BREATHNACH, Department of Agriculture, Dublin.

OFFICIAL CORRESPONDENTS OF THE COMMONWEALTH BUREAU OF HORTICULTURE AND PLANTATION CROPS

Aden Protectorate:
The Director of Agriculture.

Australia:
W. A. T. Summerville, D.Sc., Director, Department of Agriculture and Stock, William Street, Brisbane, B.7, Queensland, and F. M. Read, M.Agr.Sc., Department of Agriculture, Melbourne, Victoria.

Bahamas:
The Colonial Secretary, Nassau.

Barbados:
Agronomist, Department of Science and Agriculture.

Basutoland:
Director of Agriculture and Livestock Services, Department of Agriculture, Maseru.

Bechuanaland:
Director of Agriculture, Department of Agriculture, Mafeking, Cape Province, South Africa.

Bermuda:
Director of Agriculture, Agricultural Station, Paget East.

British Guiana:
Director of Agriculture, Department of Agriculture, Georgetown.

British Honduras:
Director of Agriculture, Department of Agriculture, P.O. Box 149, Belize.

Brunei:
The State Agricultural Officer.

Canada:
H. Hill, B.S.A., M.Sc., Ph.D., Chief, Horticulture Division, Central Experimental Farm, Ottawa, Ontario.

Ceylon:
A. V. Richards, M.Sc.(Calif.), B.Sc.(Lond.), Dip. Agric. (Cantab.), A.I.C.T.A.(Trin.), Horticultural Officer, Department of Agriculture, Peradeniya.

Cyprus:
W. Alan, Director of Agriculture, Nicosia.

Fiji:
B. E. V. Parham, O.B.E., Senior Agricultural Officer, Suva.

Gold Coast:
P. S. Hammond, M.B.E., Assistant Director of Agriculture, Department of Agriculture, Bunsu via Besuso.

Hong Kong:
Director of Agriculture, Forestry and Fisheries.

India:
B. N. Uppal, Ph.D.(Iowa), F.N.I., The Agricultural Commissioner with the Government of India, Indian Council of Agricultural Research, Jamnagar House, Mansingh Road, New Delhi.

Republic of Ireland:
Prof. G. O. Sherrard, A.R.C.Sc.I., Albert Agricultural College, Glasnevin, Dublin.

Jamaica:
Director of Agriculture, Kingston.

Kenya:
T. H. Jackson, Dip. Hortic., Agricultural Officer (Horticulture), Fruit Experiment Station, P.O. 100, Molo, Kenya.

Leeward Islands:
W. E. Bassett, M.B.E., Agricultural Superintendent, Montserrat.

Federation of Malaya:
Director of Agriculture, Department of Agriculture, P.O. Box 1004, Kuala Lumpur.

Mauritius:
Deputy Director of Agriculture, Reduit.

New Zealand:
A. M. W. Greig, B.Sc., N.D.H., Director, Horticulture Division, Department of Agriculture, Vickers House, Woodward Street, Wellington.

Nigeria:
Research Adviser, Agricultural Department, Moor Plantation, Ibadan.

North Borneo:
Director of Agriculture (*ex-officio*), Jesselton.

Northern Rhodesia:
Director of Agriculture, P.O. Box 660, Lusaka.

Nyasaland:
S. T. Hoyle, The Agricultural Research Station, P.O. Lilongwe, Nyasaland.

Pakistan:
Syed Mohamed Ibrahim Shah, M.Sc.(Utah), M.Sc.(Bristol), Fruit Development Adviser, Block No. 18/1 Pakistan Secretariat, Karachi.

Sarawak:
Director of Agriculture, Kuching.

Seychelles:
Director of Agriculture, Department of Agriculture, Victoria, Mahe.

Sierra Leone:
The Horticulturist, Department of Agriculture, Freetown.

Somaliland:
Director of Agriculture and Veterinary Services, Hargeisa.

Southern Rhodesia:
C. N. Hayter, F.I.P.A.(S.A.), Government Horticulturist, Department of Research and Specialist Services, P.O. Box 8025, Causeway.

St. Helena:
The Agricultural and Forestry Officer.

Sudan:
A. G. McCall, B.Sc.(Agric.), N.D.A., Director of Agriculture, Ministry of Agriculture, Khartoum.

Swaziland:
Principal Veterinary and Agricultural Officer, Department of Agriculture, P.O. Box 21, Bremersdorp.

Tanganyika Territory:
Senior Research Officer, Coffee Research and Experimental Station, Lyamungu, P.O. Moshi.

Trinidad:
B. G. Montserin, Ph.D., M.Sc., B.S.A., Chief Scientific Officer, Department of Agriculture.

Uganda:
The Senior Botanist, Department of Agriculture, Kawanda.

Union of South Africa:
F. G. Anderssen, B.Sc., Ph.D., Chief, Division of Horticulture, Department of Agriculture, P.O. Box 994, Pretoria.

Windward Islands:
- *Grenada:* Superintendent of Agriculture, Department of Agriculture, St. George.
- *St. Lucia:* Agricultural Superintendent, Department of Agriculture, Castries.
- *St. Vincent:* Agricultural Superintendent, Department of Agriculture, Kingstown.

Zanzibar:
G. E. Tidbury, B.Sc.(Lond.), A.R.C.S., A.I.C.T.A., Agricultural Officer, Department of Agriculture.

F.A.O. CORRESPONDENT

F. P. Pansiot, Horticulturist, Plant Production Branch, Agriculture Division, Rome, Italy.

SCIENTIFIC STAFF OF BUREAU

Consultant Director	*F. R. Tubbs, M.Sc., Ph.D.*
Director	D. Akenhead, O.B.E., M.A., B.Sc.
Assistant Director	G. K. Argles, Dip. Hort. Wye, A.I.C.T.A.
Scientific Assistants	V. H. Goldschmidt, Ph.D. J. Dundas, B.Sc. Miss P. J. Rowe-Dutton, B.Sc.Hort. Mrs. E. Ulyatt, Dip. Hort. Eisgrub. Miss E. M. J. Napier, B.Sc.Hort.

HORTICULTURAL ABSTRACTS

Vol. XXV March 1955 No. 1

Initialled abstracts and reviews not by Bureau staff are by G. H. Freeman, J. E. Goode, N. H. Grubb, R. V. Harris, A. H. M. Kirby, H. B. S. Montgomery, and H. C. Ruck of the East Malling Research Station, G. St.C. Feilden and M. Page.

INDEX OF CONTENTS.

Nos.

MISCELLANEOUS Abstr. 102. Noted 36 1-104j
- General 1-7
- Atmospheric pollution 8
- Biochemistry 9-27
- Physiology 28-33
- Photoperiodic response 34-40
- Growth substances 41-53
- Tissue culture 54-63
- Seed problems 64-69
- Nutrition and manures 70-82
- Irrigation 83-85
- Glass and glass structures 86-89
- Apparatus and devices 90-102
- Noted 103a-104j

TREE FRUITS, DECIDUOUS Abstr. 101. Noted 24 105-206x
- General 105-112
- Breeding and varieties 113-127
- Propagation and rootstocks 128-140
- Pollination 141-145
- Growth 146-154
- Spraying for cultural purposes .. 155-168
- Fertilizers and soil management .. 169-187
- Pruning 188
- Composition of fruits 189-192
- Storage 193-199
- Packing and processing 200-205
- Noted 206a-206x

SMALL FRUITS, VINES AND NUTS Abstr. 66. Noted 17 207-273q
- Small fruits 207-237
- Vines 238-266
- Nuts 267-272
- Noted 273a-273q

PLANT PROTECTION OF DECIDUOUS FRUITS Abstr. 139. Noted 39 274-414m
- General 274-276
- Disturbances of nutrition or of unknown origin 277-283
- Climatic factors 284-290
- Viruses 291-307
- Bacteria 308-316
- Fungi 317-349
- Nematodes 350-357
- Mites 358-359
- Insect pests 360-381
- Rodent pests 382-385
- Other hostile bodies 386-387
- Antibiotics 388-391
- Fungicides 392-395
- Insecticides 396-401
- Spray apparatus and damage 402-412
- Noted 413a-414m

WEEDS AND WEED CONTROL Abstr. 77. Noted 12 415-492l
- General 415-419
- Particular weeds 420-431
- Control of aquatic weeds 432-434
- Control of woody plants 435-439
- Weed control in fruit crops 440-444
- Weed control in ornamentals and turf 445-453
- Weed control in tropical crops .. 454-457
- Weed control in vegetables and tobacco 458-472
- Herbicides and apparatus 473-491
- Noted 492a-492l

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE Abstr. 210. Noted 22 493-703v
- General 493-526
- Asparagus 527-529
- Brassicas 530-541
- Celery and celeriac 542-544
- Cucurbits 545-560
- Legumes 561-601
- Mushrooms 602-603
- Onions and related crops 604-612
- Parsley 613
- Root crops 614-629
- Salad crops 630-638
- Spinach and New Zealand spinach .. 639-641
- Tomatoes, eggplants and capsicums .. 642-699
- Sundry crops 700-702
- Noted 703a-703v

TOBACCO Abstr. 34. Noted 12 704-738l
- General 704
- Breeding and selection 705-707
- Planting and cultural treatment .. 708-712
- Fertilizers 713-719
- Diseases 720-729
- Nematodes 730-733
- Curing 734-737
- Noted 738a-738l

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS Abstr. 62. Noted 23 739-801w
- Culinary and spice plants 739-745
- Drug plants 746-758
- Essential oils 759-763
- Fibres 764-768
- Hops 769-778
- Insecticidal plants 779-781
- Rubber plants 782-783
- Seed oils 784-791
- Tannin plants 792-794
- Sundry plants 795-800
- Noted 801a-801w

INDEX OF CONTENTS—*continued*

	Nos.
FLORICULTURE Abstr. 82. Noted 26	802-884z
General	802-812
Annual and herbaceous plants ..	813-823
Bulbs, tubers, etc.	824-848
Lawns	849-850
Orchids	851-852
Roses	853-855
Other trees and shrubs	856-883
Noted	884a-884z
SUB-TROPICAL FRUIT AND PLANTATION CROPS Abstr. 100. Noted 22	885-985v
General	885-886
Avocadoes	887-890
Citrus—general	891-895
Citrus—varieties and rootstocks ..	896-900
Citrus—soils and orchard management	901-904
Citrus—composition and nutrition ..	905-918
Citrus—growth phenomena and physiology	919-927
Citrus—pollination	928-929
Citrus—frost effects	930-932
Citrus—diseases and pests	933-950
Citrus—harvesting, packing and storage	951-961
Dates	962-963
Feijoas	964
Litchis	965-966
Macadamias	967-968
Olives	969-978
Passion fruit	979
Persimmons	980
Tung	981-984
Noted	985a-985v
TROPICAL FRUIT AND PLANTATION CROPS Abstr. 146. Noted 50	986-1133x
General	986-992
Bananas	993-1001
Cacao	1002-1016
Cinchona	1017
Coconuts	1018-1024
Coffee	1025-1032
Guavas	1933-1035
Mangoes	1036-1039
Oil palms	1040-1047
Papaws	1048
Pineapples	1049-1053
Rubber trees	1054-1078
Sugar cane	1079-1105
Tea	1106-1126
Sundry crops	1127-1131
Noted	1132a-1133x
NOTES ON BOOKS AND REPORTS Abstr. 47. Noted 12	1134-1181l
Books	1134-1154
Annuals and reports	1155-1176
New periodicals	1177-1180
Noted	1181a-1181l

Total abstracts 1,166. Noted 295.

N.B.—Numbers sub-divided alphabetically refer to items noted but not abstracted.

EDITORIAL NOTES.

TWENTY-FIFTH JUBILEE VOLUME 1955.

In our comparatively brief life we have tried to move with the times, drawing in our horns where particular subjects could be more efficiently dealt with elsewhere and casting our net wider when circumstances have made it desirable.

Thus potatoes, originally a horticultural delicacy and dealt with by us when we adopted vegetables, has become a staple field crop and is now covered by *Field Crop Abstracts*.

We have also relinquished to the D.S.I.R., London, the now highly specialized technique involved in the storage and processing of fruit and vegetables and this is covered in *Food Science Abstracts*.

Acquisitions far outweighing these defections have included the vast field of vegetable growing, tobacco and many perennial economic crops.

Further, like almost too many others, we have of late become weed conscious and nowadays considerable space in each number is devoted to that infuriating topic.

The inclusion of these important subjects, of a much fuller List of Contents, of our abstract of abstracts, Salient Items, and finally the phenomenal increase in horticultural literature have led to the present bulky journal.

During this period of expansion printing costs have risen 27-fold, the number of articles abstracted or noted 13-fold, the subscription price 10-fold and the number of subscribers 7-fold.

In 1955 we hope to welcome our 1,000th subscriber. One fine day we may even overtake our printing costs.

We rely on our readers to keep us from stagnating.

NOTES OR BIBLIOGRAPHIES AVAILABLE.

In the last number of *Horticultural Abstracts* we promised to supply in this number a list of some of the more important notes and bibliographies prepared as stencils during 1954 in reply to enquiries. This list is now set out below.

If any reader is interested in one or more of the subjects dealt with, all he has to do is to write and *ask us* [NOT *C.A.B., Farnham Royal!*] for a copy, *quoting the relevant query file number or numbers*. Copies will this year be sent free of charge, but it must be emphasized that the numbers available are limited and we cannot hope to meet omnibus requests from laudably magpie-minded librarians or to re-type any of the items unless the demand is found very greatly to exceed the existing supply. So that our more distant readers may not suffer under a handicap some copies of each item will be held in reserve for them until a decent interval of time has elapsed.

Query File No.	*Subject.*	*Information given.*
2558	Note on **Apple varieties and rootstocks for regions with mild winters**	3 pages
2564	Bibliography on **Coffee cytology, genetics, selection and breeding**	236 references
2568	Notes and bibliography on the **Stimulation of pollen germination and development as an aid to fruit setting**	5 pages + 29 references
2573	Annotated bibliography on **Agricultural and horticultural uses of hydrogen peroxide with special reference to seed treatment**	17 references
2589	Bibliography of **Recent literature on soilless culture**	124 references
2607	Bibliography on **Weed control in vegetable crops**	175 references
2610	Translation from Dutch article by J. Floor on **Plants in plastic**	8 pages
2612	Bibliography of **Articles containing illustrations on the use of electric lamps in horticulture**	22 references
2618	Bibliography on **Coffee irrigation, mulching and nutrition**	179 references
2634	Bibliography on **Manila hemp (*Musa textilis*)**	82 references
2639	Notes and bibliography on the use of **Peat as a mulching material**	2 pages + 10 references
2646	Bibliography on ***Cannabis sativa***	72 references
2650	Annotated bibliography on the **Chemical composition of vegetables**	99 references
2660	Partially annotated bibliography on **Coconut cultivation and products**	453 references
2668	Annotated bibliography on **Apricot rootstocks**	24 references
2686	Bibliography on **Nastic movements of flowers**	36 references
2692	Notes and bibliography on **Recent investigations on non-parasitic disorders affecting tomato fruits**	4 pages + 37 references
2703	Notes and bibliography on **Regulating the fruiting of pineapples by the use of growth substances and other methods**	3 pages + 26 references
2705	Notes and bibliography on the **Vegetative propagation of pecans**	2 pages including 7 references
2709	Notes and bibliography on the **Control of mealy bugs on vines**	3 pages including 17 references
2716	Bibliography on the **Cultivation and seed production of European vegetables in the tropics**	42 references

SALIENT ITEMS. Vol. 25. No. 1.

CLIMATES, NATURAL AND ARTIFICIAL.

Too much or too little cold:—If warm weather in early winter causes some measure of dehardening, or should one say resoftening, in raspberries, they may reharden to some extent later on (286). With peaches continuous, moderately high temperatures retard flower bud development more than do brief periods of higher temperature, but the reverse is true of wood buds; the early and late parts of the winter are less critical than the middle (151). With tomatoes it begins to look as though frost resistance can be obtained both by selection (642) and by a hardening-off process (643).

Light and temperature:—A number of weighty papers are devoted to studies on the effects of photoperiod and vernalization (34-40, 631, 632, 763, 818-820, 865), several of them providing evidence on the sites of reception of the stimuli within plants. Other aspects covered in these papers include the photoreactions of seeds and buds of the same species (865), the effects of red and infra-red lights on seeds and plants (39, 631), and the use of ethylene chlorohydrin gas to promote flower induction under day-length conditions unfavourable for the purpose (40). Finally, mention should be made of the response of sugar cane setts (cuttings) to treatment with different coloured lights (1086), and of a quantitative study which suggests that reduction in light intensity by weeds may be a major factor in their competition with vegetable crops (458).

Water relations and irrigation:—The controversy surrounding the ability of a tomato plant to absorb water through its leaves and exude it through its roots is assuming the character of an annual sporting event; the latest information, on the side of the Noes, may be found in abstract 655. That rather neglected field, the water relations of tree crops, forms the subject of a paper on pears grown on two rootstocks (283). On the practical side several papers deal with methods of applying, or of measuring the need for, irrigation water (83-85, 513, 654, 1091, 1092).

Smog:—It is doubtful if much comfort will be derived from the fact that beans infected with rust are much less sensitive to smog than healthy beans (581). Better news is the discovery that injury by petroleum-type smog can be prevented by spraying plants with several well-known fungicides (8). For further information on the sensitivity of fruit trees to atmospheric fluorine see abstract 290.

DISEASE AND PEST CONTROL.

Incidence and importance:—After reading through the usual mass of papers devoted to symptoms, transmission or the application of a multiplicity of noxious chemicals we cannot help wondering if the time has not arrived when more attention might usefully be directed to the ecological and economic aspects of host-parasite relations. As to the former we would point rather diffidently to two papers (361, 317), the first relating to changes in insect pest population associated with changing climatic conditions and the second to correlations between the incidence of fungi and rainfall in certain months. As to such economic aspects as the effects of diseases and pests expressed in terms of yield or control expressed in terms of enhanced value there appears to be little or nothing of importance—or have we missed it?

Nematodes or eelworms:—Each of the three most recent papers on soil sickness inclines to the view that nematodes are the main culprits (184, 352, 353). That these pests may provide pitfalls for the unwary plant selector testing new varieties or strains is illustrated by the results of a study on strawberry clones (357). On the question of control mention may be made of hot water (356), a compound called 3-*p*-chlorophenyl-5-methyl rhodanine (686) and the development of a laboratory technique for screening compounds (351).

Viruses:—Tucked away in one paper is a statement that one of the viruses afflicting hops may render the host plant resistant to a fungus disease (775). Increasing efforts are being made, though with varying success, to inactivate viruses with heat (304, 305, 517, 583), chemicals (295, 722) and fungus extracts (721). A new method of creating healthy stocks of dahlias from infected parent material also deserves attention (830).

A new menace:—Geese attacking the stems of young apple trees (386).

Fungicides and insecticides:—The growing interest in antibiotics is reflected in the large number of papers on the subject (308-312, 315, 316, 388-391, 558, 593, 676, 726, 727, 729, 790). Among the more conventional fungicides reference might perhaps be made to the synergistic or tonic effect of adding traces of copper to organic fungicides (346, 347), the indirect way in which sub-lethal doses of a fumigant may kill a fungus by stimulating another organism to invade it (327), studies to determine which fractions of coal tar distillates are most effective against a wound parasite (1068), and a technique for testing materials on pruning wounds (188). Among insecticides it is surprising to find that cyanamide may have a systemic action against aphids (521). The use of methyl ethyl ketone as a solvent greatly enhances the persistence of DDT (400), which makes it all the more desirable to obtain more information about methods of determining its residues (409). Finally, coming down to earth, the gardener is presented with an effective general-purpose pesticide for use on all his vegetables (519).

GROWTH REGULATION.

Dwarfing trees:—The growth of apple trees can be checked by the use of phloem blocks produced either by inserting rings of inverted bark or by exposing stem segments to X-rays (148, 149). Plain rings also checked growth in citrus but only induced flower formation when growth inhibitors were applied to the rings (923).

Growth substances:—Among many papers mention may be made of studies showing the marked effects of growth substances on phosphorus translocation in plants (53), and the stimulating and inhibitory effects respectively of milk from young and from old coconuts on the germination of coconut embryos (1019). The compound 4-phthalimido-2,6-dimethylpyrimidine has produced response in plants very similar to that of auxins, although its structure is quite different (50). The response of tobacco to chemical stimulants is described in two papers (710, 711).

MACHINERY AND EQUIPMENT.

Machines and implements:—These include a rotary cultivator designed for use in strawberries (236), an implement for applying fertilizers to a depth of 50 cm. in orchards (179), an implement for transplanting large trees (185), machines for harvesting asparagus (528, 529), green beans (597), gladiolus corms (837) and hops (776) and a machine for cleaning pots (98).

Sprayers:—New sprayers include a large tractor-mounted unit designed for vineyards (406), a low-volume type carried by a man (404), and two sprayers developed for experimental plots (488). Comparisons are being made between boom and boomless herbicide sprayers (489). Improvements to existing equipment are described in two cases (405, 490). Mention may also be made of an instrument which measures drop sizes in sprays (407) and of an investigation into the effects of pruning fruit trees on spray deposits (408).

Tools, apparatus and techniques:—Tools described include those used in propagation (97) and a tool for injecting herbicides into trees (438). Apparatus includes aluminium foil planting boxes for greenhouse experiments (96), a simple plant irradiator (99), a pollen collector-duster (252), and devices for measuring the total length of prunings (152), for recording growth measurements of tree trunks (95) and of tulip bulbs (847), for washing tissues (90) and homogenizing them (92) and for measuring evapo-transpiration (94). New techniques include a tracer method of measuring the patterns and growth of plant root systems (33), the application to plant material of the freeze-dry method of preparing tissues for histological examination (91) and the use of a plastic lacquer substitute for coverslips (93).

PLANT NUTRITION.

Plant composition:—The chemical composition of plants is considered in relation to their systematic position in three papers (12, 13, 19). Seasonal changes in the nutrients present in leaves or fruits are described in two papers on apples (175, 176) and three on citrus (906, 908, 919). Similarly in tea there are seasonal variations in phenolic compounds (1117) as well as differences between very young seedlings and older plants (1116).

Foliar diagnosis:—The analysis of leaf extracts, instead of whole leaves, may provide a cheap, rapid and accurate method of determining levels of all the major elements, except nitrogen, in apples (174). A close relationship has been found between the number of calcium oxalate crystals present in the phloem parenchyma of the tea leaf petiole (the phloem index) and the potash/phosphorus ratio in the leaf (1113).

Nutrient needs and absorption:—Successive generations of a tomato variety grown in saline soils showed reduced uptake of chloride and produced better growth and yields (669). In a trial with tung seedlings, using a new technique, the rate of potassium absorption from monovalent salts was faster than that from polyvalent salts (984). Studies are also reported on fertilizer placement (507, 508), the effects of chelated sodium and manganese in soils and plants (74) and on the effects of boron on phosphorus absorption and translocation (72).

Foliar nutrition:—Mention may be made of studies on the application of urea sprays to citrus trees (910), on the absorption of zinc and manganese from dithiocarbamate fungicides (668) and on the beneficial effects on plants of phosphorus smokes generated for frost protection (75).

PLANT PROPAGATION.

Seed:—Exposing seeds in packets to high humidities and temperatures may reduce their viability (497). The tetrazolium test for viability may be upset by the action of micro-organisms on the solution but this can be prevented by adding a bactericide (64). Heat and soaking treatments can markedly improve the germination of cucumber seeds (550-552). Soaking followed by cold treatment of tomato seed affects the number of flowers produced rather than the time of flowering (650). The germination of vegetable seeds is affected by depth of sowing, and soil compression, moisture and atmosphere (502). A positive relationship exists in some vegetables between seed size and earliness and total yield (627). Finally, valuable rhododendron seed may be germinated successfully by a laboratory method hitherto used for orchids (877).

Cuttings:—Some of the many small ways in which the rooting of hardwood cuttings may be influenced is shown in studies on gooseberries (218). The use of fungicides to sterilize cuttings has been further tested, this time using poplars (874, 875). The position of the cutting on the parent plant has been shown to affect the shape and other characters of the plants produced both in herbaceous and woody types (29). The constant-mist system has proved satisfactory for rooting softwood grapevine cuttings (249). Beetroot and related plants raised from cuttings produced higher yields of roots than did seedlings (615).

Grafting:—Successful reciprocal inter-family grafts are recorded between members of the Portulacaceae and Chenopodiaceae (701). Supplementary light encouraged quicker and better unions between birch species (866). A new technique involving the protection of graft unions with polyethylene film has given good results in grafting difficult subjects (861).

Transplanting:—Polyethylene film bags have also aided the shipment of plants (806) as has a new plastic coating used as a dip or spray (101). The nature and extent of the recovery from transplanting check has been studied in vegetables (504).

Seedlings *vs.* budlings:—Comparisons between seedling and budded progeny of several tung mother trees have revealed a significant interaction between method of propagation and mother-tree effect (981). In another trial recovery from winter injury was much less satisfactory in budlings than in seedlings from the same mother tree (982).

MISCELLANEOUS.

Browning of fruits:—It seems probable that chlorogenic acid and the newly identified compound *neo*chlorogenic acid are largely responsible for enzymatic browning in stone fruits (191).

Economics:—Attention may be drawn to four papers concerned with the labour requirements and yields of apples (105, 108, 109, 183).

Environment and sex differentiation:—A case is recorded in which male and female hop seedlings tended to occur in groups (769).

Hemicellulose:—It appears that hemicellulose, like starch, acts as a reserve carbohydrate in vines and plays an active part in metabolism (264).

Mulch:—The application of expanded vermiculite as a mulch in narrow bands over seed rows has improved both emergence and yields of various vegetables (505).

Pollen germination:—Volatile substances emanating from leaves of some species stimulate germination while those from other species retard it (145).

Stomatal movement:—A new theory is propounded which postulates, among other things, that the important active movement is that of closure (21).

Stuffing for the nursery:—In East Germany the sweet service berry (*Sorbus* sp.) has been entered on the official list of fruit varieties, a concentrated juice from it being available for infants (127).

MISCELLANEOUS.

General.

(*See also* 103j, t, 104a, 1137, 1145, 1161, 1162, 1172, 1175.)

1. FOREIGN AGRICULTURAL INFORMATION SERVICE.
Dutch agriculture. Facts.
[*Publ.*] *Minist. Agric. Netherlands*, 1953, pp. 156, illus.

This second edition includes a section on horticulture which is a shortened version of a previously published survey [see *H.A.*, 23: 2412].

2. N.A.A.S.
N.A.A.S. provincial experiments in horticulture. Summary of proposals 1953–54.
[*Publ.*] *N.A.A.S.*, 1–4 Cambridge Terrace, London, N.W.1, [undated], pp. 27.

Tables give the following information concerning the experiments: crop; kind, object and duration of experiment; province; number of centres. The crops include top fruit, cider fruit, soft fruit, vegetables, flowers and bulb crops, glasshouse and protected crops. Experiments are also being conducted with composted sawdust.

3. SIMMONDS, A.
The history of the Royal Horticultural Society, 1804–1954.
J. roy. hort. Soc., 1954, **79**: 457–88, illus.

The text of a lecture given on the occasion of the Society's 150th anniversary, presenting an absorbing and well illustrated account of the development of the Society and its gardens and of the personalities and work of some of its more famous members.

4. PATON, J. B.
The R.H.S. Gardens, Wisley.
J. roy. hort. Soc., 1954, **79**: 495-503, map.

A brief account of the development of the gardens since their purchase by the Society in 1903 and of their present scope.

5. CALKINS, W. F.
California's agricultural experiment station.
Agric. Chemls, 1954, **9** (11): 45-6, 129, illus.

The California Experiment Station, founded in 1875, is spread over 4 campuses and 8 field stations. Some of the aims achieved and problems solved, many of horticultural interest, are mentioned.

6. BUHR, H.
Beobachtungen über Parasitenbefall an Pfropfungen und Chimären von Pflanzen. **(Observations on pest incidence in grafts and chimaeras.)**
Züchter, 1954, **24**: 185-93, bibl. 11.

Certain leaf miners, which do not normally infest *Nicotiana rustica* or the tobacco variety Samsun, frequently attacked these plants when grafted on potato. Pests of laburnum, which do not occur on *Cytisus* spp., attacked *Laburnicytisus* and developed normally in the parenchyma of the chimaera in spite of the *Cytisus* epidermis. Similar observations are recorded for *Crataegomespilus*. [See also *H.A.*, 24: 3335.]

7. TRAPL, J.
Poškození kůže rostlinami. **(Dermatitis caused by plants.)**
Čsl. bot. Listy, 1949, **2**: 89-93 [received 1954].

A list is given of plant genera and species, including many of horticultural interest, which cause skin irritation.

Atmospheric pollution.

8. KENDRICK, J. B., JR., MIDDLETON, J. T., AND DARLEY, E. F.
Chemical protection of plants from ozonated olefin (smog) injury.
From abstr. in *Phytopathology*, 1954, **44**: 494-5.

Plant injury characteristic of that found in the San Francisco Bay area and southern California caused by exposure to ozonated gasoline or hexene-1 can be prevented by sprays or dusts of zineb, ferbam, ziram, maneb, or thiram on the plant surfaces.

Biochemistry.

9. VON KRAUSS, E., AND OTHERS.
Destruction of organic matter and determination of inorganic ions, especially manganese, in plant ash.
Indon. J. agric. Sci., 1954, **110**: 82-8, bibl. 2, illus.

Several methods of ashing fresh or dried plant material were tested at the University of Indonesia, Bandung. The best results were obtained by wet ashing with a mixture of perchloric acid and nitric acid. For Mn determinations in plant ash (banana leaves), the formaldoxime reaction is recommended.

10. DEVI, L. S.
Bio-assay of heavy metals by *Aspergillus niger*—sensitivity of a new strain.
Proc. Indian Acad. Sci., Sect. B, 1954, **40**: 1-7, bibl. 10, illus.

The standard "M" strain of *Aspergillus niger* van Tiegh, which is being used in many laboratories as a biological test to detect the presence of some heavy metals in minute traces has been compared with a new strain of the same fungus, isolated in this laboratory, from the rhizosphere of *Cajanus cajan*, and designated as M.U.B.L. 1. The new strain appeared to be less sensitive to traces of manganese, and more sensitive to copper, and perhaps molybdenum also, than the "M" strain. Further studies regarding the stability of the new strain and also attempts to secure a greater degree of purity of media are being conducted. [Author's summary]—Univ. Bot. Lab., Madras.

11. FRANK, H.
Über den Stickstoffverlust bei alternden Pflanzen. **(Nitrogen loss in maturing plants.)**
Planta, 1954, **44**: 319-40, bibl. 32.

The loss of total N in the latter part of the vegetative growth period was determined, using *Arabidopsis thaliana* and 2 varieties of *Oenothera suaveolens*. In *Arabidopsis* the maximum N– content was reached on the 85th day of an 110-day culture and the subsequent N loss was 30% of this value. With *Oenothera* the loss of N was 24% of the maximum, which was reached in the sixth month of a 10-month culture. The amino acids occurring in asparagus roots were extracted and identified by paper chromatography.

12. BERTRAND, G., AND SILBERSTEIN, L.
Nouvelles recherches sur la teneur en manganèse des phanerogames. **(New work on the manganese content of phanerogams.)**
Ann. Inst. nat. agron., série A, 1954, **5**: 319-20, bibl. 2.

The manganese contents of 389 species of phanerogams were determined, and the following observations made: manganese was found in all the dry plant material analysed; a great variation in content between species was found; almost half the plants tested contained between 20 and 50 mg. of the element in 1 kg. dry weight, and among these the most common figure was approximately 20 mg./kg. dry weight; in general, plants of the Cruciferae and Chenopodiaceae among the dicotyledons, and the Gramineae among the monocotyledons were low in manganese content.

13. VINOGRADOVA, H. G.
Molybdenum content of plants in relation to their systematic position. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1953, **93**: 163-6, bibl. 5.

The Mo content of 26 woody species of Leguminosae is given. It averaged $4\cdot10^{-4}\%$ of dry weight. The high Mo content characteristic of herbaceous legumes was confirmed for trees and shrubs of the Papilionatae which had root nodules. This is considered a further proof of the connexion between N fixation and Mo content. The Mo content of Caesalpinioideae was low, and that of *Albizzia julibrissin*, the only species of Mimosoideae tested, very high, with $1\cdot10^{-3}\%$ of dry weight.

14. HINSVARK, O. N., AND OTHERS.
Polarographic determination of zinc in plant materials.
Analyt. Chem., 1954, **26**: 1202-4, bibl. 8.

Ashed apple leaves were treated with tetrasodium Versenate solution and then dissolved in sodium hydroxide so that all the zinc was obtained as the zincate ion. The resulting solution was filtered and a polarogram was made on the filtrate.

15. WILLIAMS, K. T., AND POTTER, E. F.
Report on sugars in plants.
J. Ass. off. agric. Chem. Wash., 1954, **37**: 718-21, bibl. 4.

In further tests on methods of clarifying plant extracts for sugar analysis [see *H.A.*, 23: 3711], the ion-exchange resin method of clarification gave results as good as, and in some cases better than, the official neutral lead acetate method. Results obtained with samples of asparagus, dried cabbage, lawn grass and strawberries are tabulated.

16. ŠKOLJNIK, R. JA.
Determination of non-volatile organic acids in plant extracts by paper chromatography. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1953, **90**: 847-9, bibl. 9.

Organic acids found in the leaves of mulberry, *Aloe arborescens*, *Sempervivum globiferum* and *S. soboliferum* are listed.

17. SEN, S. P., AND LEOPOLD, A. C.
Paper chromatography of plant growth regulators and allied compounds.
Physiol. Plant., 1954, **7**: 98-108, bibl. 17.

The chromatographic behaviour of a large number of plant growth regulators and allied compounds was studied, with special reference to the indole compounds. *Iso*propanol-ammonia-water and pure water are recommended for use as developing solvents in one or two dimensional chromatography of indole compounds. The former solvent was also the best for aromatic acids. —Purdue Univ., agric. Exp. Stat., Indiana.

18. BATE-SMITH, E. C.
Leuco-anthocyanins. 1. Detection and identification of anthocyanidins formed from leuco-anthocyanins in plant tissues.
Biochem. J., 1954, **58**: 122-5, bibl. 7.

The leuco-anthocyanins present in leaves, fruits and other tissues were converted into anthocyanidins by heating the tissues with hydrochloric acid. Except in Rosaceae and a few Leguminosae (which appear to contain leuco-paeonidin) the leuco-anthocyanins appear to be restricted to leuco-cyanidin and leuco-delphinidin. [From author's summary.]

19. BATE-SMITH, E. C., AND LERNER, N. H.
Leuco-anthocyanins. 2. Systematic distribution of leuco-anthocyanins in leaves.
Biochem. J., 1954, **58**: 126-32, bibl. 12.

The presence or absence of leuco-anthocyanins in the leaves of vascular plants is related to their systematic position. In monocotyledons they are common but scattered; the classification of dicotyledons into Lignosae and Herbaceae by Hutchison in general divides those having and not having leuco-anthocyanins. The systematic distribution of leuco-anthocyanins closely follows the recorded incidence of tannins in botanical literature; they have the properties of tannins and are probably responsible for plant tissue reactions commonly attributed to tannins.

20. GOODWIN, T. W.
Studies in carotenogenesis. 13. The carotenoids of the flower petals of *Calendula officinalis.*
Biochem. J., 1954, **58**: 90-4, bibl. 14.

Hydrocarbon polyenes found in petals of a dark variety of *Calendula officinalis* were phytofluene, 3 carotenes and lycopene. The xanthophylls present were flavochrome, mutatochrome, lutein, flavoxanthin, and chrysanthemaxanthin. The relative distribution of these pigments in the petals is recorded.

21. WILLIAMS, W. T.
A new theory of the mechanism of stomatal movement.
J. exp. Bot., 1954, **5**: 343-52, bibl. 49.

After a brief examination of the classical theories of stomatal movement and their drawbacks, a new theory is propounded. It postulates (*a*) that the important movement is that of closure, opening being a return to a resting state; (*b*) that this closing is an "active", non-osmotic, energy-requiring transfer of water from guard-cell to neighbouring cells; and (*c*) that carbohydrate changes are secondary, "stabilizing" changes, probably not directly linked to the main process. The evidence for the theory is stated and discussed, and some implications are examined.

22. WILLIAMS, W. T., AND BARRETT, F. A.
The effect of external factors on stomatal starch.
Physiol. Plant., 1954, **7**: 298-311, bibl. 10.

The effects of CO_2, humidity, and light, and of their interactions on stomatal starch and aperture in *Pelargonium zonale* were studied. Starch showed a marked reduction in the absence of CO_2 and under high humidity, but was only doubtfully affected by light. The three factors acted independently on aperture. When a strip of epidermis was removed from a leaf, a significant rise in starch content in nearby stomata was produced within 30 seconds: the increase reached a maximum about 3–6 minutes after stripping, but after about 15 minutes the starch content returned to its initial value. This effect disappeared when the leaf was immersed in water, thus indicating a connexion with the water balance.—Univ. of Southampton.

23. WEBSTER, G. C.
The effect of carbon monoxide on respiration in higher plants.
Plant Physiol., 1954, **29**: 399-400, bibl. 5.

Carbon monoxide inhibited respiration in root tissue of larkspur, radish, beet, bean, tobacco and sunflower, and in fruit tissue of apple and cucumber. The inhibition was largely or completely removed, except in the apple fruit, by irradiating the tissues.—Kerckhoff Lab. Biol., Pasadena, Calif.

24. MUELLER, L. E., CARR, P. H., AND LOOMIS, W. E.
The submicroscopic structure of plant surfaces.
Amer. J. Bot., 1954, **41**: 593-600, bibl. 12, illus.

Electronmicrographs are presented which show the method of extrusion of surface wax from the cuticle and something of the variability of wax forms on leaves and herbaceous stems. The importance of wetting agents for chemical sprays is clearly shown by the photographs, as small water droplets would remain on the wax to dry without contacting the cuticle.

25. STÅLFELT, M. G.
The relation between the fluidity of the protoplasm and the insertion and function of the leaves.
Physiol. Plant., 1954, **7**: 354-74, bibl. 32.

The protoplasmic fluidity in several terrestrial plant species was studied. The fluidity was greatest in the fully grown leaf, decreasing both apically and basically. A decrease in fluidity could sometimes be noted earlier than the outward signs of destruction (e.g. yellow patches, attacks by fungi). This was interpreted as an indication that destruction starts with a change in the state of the protoplasm.

26. SEMENENKO, G. I., AND TIMAŠOVA, O. A.
The nucleic acid content of leaves during vegetative hybridization. [Russian.]
Biohimija, 1954, **19**: 543-8, bibl. 12.

As a result of metabolic changes occurring during interspecific vegetative hybridization the processes of nucleic acid formation in the cells are substantially changed. By grafting tomatoes on eggplants and *vice versa* the content of nucleic acid in the leaves was greatly reduced. The F_1 and F_2 generations of the vegetative hybrids showed increased hybrid vigour and a higher nucleic acid content in the leaves and young shoots than did the original forms.

27. NAGANNA, B., AND SRIPATHI, C. E.
Pyrophosphatases in plants during growth.
Nature, 1954, **174**: 593-4, bibl. 6.

Wheat and french bean plants were used in a study of the comparative distribution of acid and alkaline pyrophosphatases and acid glycerophosphatase at different stages of plant growth. The activities of the 3 enzymes in different parts of the plants are tabulated. It is concluded that the alkaline pyrophosphatase is associated with the anabolic processes in the leaf, while the acid pyrophosphatase participates in the catabolic processes taking place during translocation of the carbohydrates synthesized in the leaf.—Madras vet. Coll.

Physiology.

(*See also* 655.)

28. VAN DEN ENDE, J.
Groeiafwijkingen die samenhangen met de waterhuishouding in de plant. **(Physiological diseases related to the water status in plants.)** [English summary $\frac{1}{3}$ p.]
Meded. Dir. Tuinb., 1954, **17**: 615-36, bibl. 41, illus.

The author discusses the internal water relationship of plants as it affects the occurrence of such physiological diseases as tipburn in lettuce, shanking in grapes, and "waterziek" in cauliflower. Further understanding of the symptoms could be obtained by research into this relationship, and some suitable methods for this are discussed.

29. EREMEEV, G. N.
The importance of biological heterogeneity of buds of solanaceous and citrus plants in vegetative propagation. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **95**: 403-6, bibl. 14.

The work reported was carried out on tobacco, potato and seedling citrus at the Yalta Botanic Garden. The stems of tobacco plants, 58–62 cm. high with 17–19 leaves, and of a 1-year-old seedling pomelo (*Citrus natsu daidai* (*Hayata*)) No. 53 were divided into 6 portions. These were used as cuttings and rooted. Tobaccos grown from the 5th cuttings from the bottom grew most vigorously, while those from the 3rd cuttings formed the earliest buds. Citrus, observed over 2 years, grew most vigorously from the lowest cuttings. Plants from the 1st and 2nd lowest cuttings produced trees with a pyramidal crown, those from the 3rd and 4th an umbrella-shaped crown and those from the 5th and 6th a prostrate, spreading crown.

30. DANILOV, M. D.
Diurnal periodicity in the growth of shoots of some tree and shrub species. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **96**: 205-8, bibl. 5.

Growth measurements made on 12 woody species at Ioškar-Ola [Trans-Volga] in 1944 showed that, with the exception of a young pine, the plants grew at a faster rate during the day than at night. The difference between day and night growth was larger in southern species such as black locust, ash and oak than in northern species such as Siberian acacia, elder, aspen and pine.

31. PETROVSKAJA, T. P.
Winter growth and differentiation of flower buds in woody plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **96**: 213-16, bibl. 8.

The plants studied from autumn 1949 to spring 1952, under Moscow conditions, included 2 species each of lilac and cherry. Buds of the different species overwintered in different stages of differentiation and did not grow during the dormant period. Entering into dormancy and emerging from it appeared to be lengthy processes; bud tissues which grew longest in the autumn resumed growth first in the spring. The suggestion that buds develop during the winter is refuted.

32. YOUNIS, A. F.
Experiments on the growth and geotropism of roots.
J. exp. Bot., 1954, **5**: 357-72, bibl. 23.

Decapitation of root apices of *Vicia faba* at 2 mm. from the tips retarded subsequent growth. The removal of shorter parts gave less or no growth retardation. The growth of stumps reheaded with their own tips was similar to that of decapitated stumps. Roots decapitated at 0·5 mm. from the tip, with and without reheading, responded to gravity when placed horizontally, in the same way as intact control roots. When 1 or 2 mm. of the root apices were cut off, there was no response to gravity stimulus. In *Sinapis alba* and *Vicia faba* the geotropic curve of the root was shown to be due to an increase in length of the cells on the convex side.—Alexandra Univ., Egypt.

33. HALL, N. S., AND OTHERS.
A tracer technique to measure growth and activity of plant root systems.
Tech. Bull. N.C. agric. Exp. Stat., 101, 1953, pp. 40, bibl. 15, illus.

A method is presented for studying the distribution and activity of plant roots. Some of the possible interpretations of the data obtained from trials with maize, cotton, groundnut and tobacco roots are discussed. The method consists of strategically locating a small amount of radioactive material (P^{32}) at given distances from and below the plant and noting its uptake by the plant. Considerable differences were noted in the root patterns and regions of maximum activity in the different plants, tobacco showing the greatest relative activity in the 16 in. layer. The data were used to estimate the fertility pattern of the soil most likely to give maximum yields, the population density most compatible with root development and the volume of soil from which the plant extracts most of its water. [See also *H.A.*, 24: 1667.]

Photoperiodic Response

(*See also* 103m, 233, 619, 631, 632, 656, 657, 818-820.)

34. WAGENAAR, S.
A preliminary study of photoperiodic and formative processes in relation to metabolism, with special reference to the effect of night temperature.
Meded. LandbHoogesch. Wageningen, 1954, **54**: 45-101, bibl. 60.

In a series of experiments the relationship between photoperiodic effects and metabolism was studied in spinach, *Hyoscyamus niger* and *Brassica rapa*, all long-day plants. Results showed that in spinach the flowering response increased with night temperature up to 13° C. and that between 13° and 27° C. the influence of night temperature was small. In *Brassica* and *Hyoscyamus* flowering response increased with night temperature between 2° and 27° C. The greatest leaf area in *Hyoscyamus* occurred at 27° C., while in spinach and *Brassica* it occurred between 13° and 20° C. Cold night treatment given at the beginning of experiments on spinach inhibited flowering proportionally to the number of cold nights given. In *Brassica* flowering was promoted by initial cold treatment if the subsequent night temperature was between 9° and 20° C. Flowering in *Hyoscyamus* was retarded by cold nights with decreasing influence as the length of treatment increased. After flower initiation there was a sudden increase in the rate of stem elongation and new leaf formation. An interruption in the middle of the dark period by light at an energy of $25 \cdot 10^6$–$30 \cdot 10^6$ erg./cm.^{2} hastened flowering in spinach: temperature modified the response to interruption by light, low temperatures causing retardation of flowering. There was no apparent direct relationship between starch hydrolysis and flowering in spinach; sucrose applications had a small promoting influence on flower initiation in spinach at a daylength of 10 hours. The author concludes that the complexity of the processes of flowering, as demonstrated further in these experiments, makes it improbable that the relationship between photoperiodic effects and metabolism will ever form the subject of a simple theory.

35. WAREING, P. F.
Experiments on the "light-break" effect in short-day plants.
Physiol. Plant., 1954, **7**: 157-72, bibl. 17.

The effects of light breaks given during very long dark periods were investigated in 2 short-day plants, Biloxi soybean and *Xanthium pennysylvanicum*, in relation to various lengths of photoperiod and to total cycle-length. A light-break given during the early part of a long dark period inhibited flowering in both plants, regardless of the duration of the main photoperiod. A light-break given towards the end of the dark period was inhibitory in soybean, but in *Xanthium* the effect was slight or absent. Under certain conditions a light-break given in the middle of the dark period appeared to have a stimulatory effect on flowering in soybean.—Univ. of Manchester.

36. WAREING, P. F.
Growth studies in woody species. VI. The locus of photoperiodic perception in relation to dormancy.
Physiol. Plant., 1954, **7**: 261-77, bibl. 20, illus.

First-year seedlings of several woody species, which had been induced to form resting buds by short-day treatment, were placed in continuous illumination. *Betula pubescens*, *Larix decidua* and *Fagus sylvatica* expanded their buds and resumed extension growth, but *Acer pseudoplatanus* and *Robinia pseudacacia* remained dormant. In dormant, leafy seedlings of *B. pubescens*, both buds and leaves had to be exposed to continuous illumination for growth to be resumed. Normal bud expansion of *B. pubescens* was inhibited when the leaves were under short-day conditions, even when the buds were exposed to continuous illumination. *Quercus robur* required similar conditions for the production of lammas-shoots. The response of the shoot apex in actively-growing seedlings of *B. pubescens* was controlled by the photoperiod to which it was exposed, regardless of the daylength under which the leaves were maintained. In *A. pseudoplatanus* and *R. pseudacacia* the response of the shoot apex was determined by the daylength conditions to which mature leaves were exposed. It is suggested that a growth-inhibitor is produced by the leaves during long dark periods, and the production of this inhibitor is suppressed under continuous illumination.—Univ. of Manchester.

37. DE ZEEUW, D.
De invloed van het blad op de bloei. (**The influence of the leaf on flowering.**) [English summary 1½ pp.]
Meded. LandbHoogesch. Wageningen, 1954, **54**: 1-44, bibl. 131, illus.

The influence of the leaf on flowering in *Perilla*, tomato, and bean (*Phaseolus*) was investigated by varying the light intensity and by defoliation. *Perilla*, a short-day plant, flowered even in continuous light if the intensity was sufficiently low, but the light intensity range for flowering decreased with increasing daylength. When a pair of shoots growing from the same node were treated differentially, the shoot receiving low light intensity was able to initiate flower primordia in the other shoot receiving high light intensity; this influence was increased when the latter was defoliated. Defoliation had no qualitative effect on flowering: a total leaf area of 0·5 cm.² was sufficient for flower initiation under favourable conditions. In tomato the number of leaves formed before the first flower truss decreased with increased light intensity; at very low light intensity plants remained vegetative throughout the year. Defoliation did not affect the number of leaves formed before the first truss, but stimulated the development of axillary shoots, advanced flower initiation, increased flower number and caused formation of "vegetative" flowers. In bean flower initiation was independent of light intensity, daylength, and cotyledon and leaf removal. There was a positive correlation between flower number and light intensity, and cotyledon removal reduced flower number. Defoliation of the main shoot stimulated the development of axillary shoots which, if also defoliated, increased the flower number. The author concludes that flowering is possible when a certain balance is reached between the quantity of available assimilates and growth substance level.

38. BÜNNING, E., AND KONDER, M.
Tageslänge, Blattwachstum und Blütenbildung. (**Day length, leaf growth and flower initiation.**)
Planta, 1954, **44**: 9-17, bibl. 5.

(1) In the long-day plant, *Plantago lanceolata*, and in the short-day plants, *Amaranthus caudatus* and *Perilla ocymoides*, leaves age more rapidly under long-day than under short-day conditions in relation to the length of the period of leaf growth and to the longevity of the leaf. (2) The leaf area produced by the two short-day plants under short-day conditions was larger than that produced under long-day conditions, while the opposite was true for the long-day plant. Conversely, short-day plants showed a smaller total leaf area under short-day conditions and long-day plants under long-day conditions. (3) These findings suggest that by influencing growth and ageing of the leaf the photoperiodic stimulus regulates the total leaf area to be produced. Earlier experiments have shown that young, growing leaves inhibit flower initiation. [Translation of authors' summary.]—Univ. Tübingen.

39. LEOPOLD, A. C., AND GUERNSEY, F. S.
Respiratory responses to red and infra-red light.
Physiol. Plant., 1954, **7**: 30-40, bibl. 19.

The effects of red and infra-red light were studied on the respiration of leaf sections of some photoperiod sensitive plants, and of light sensitive seeds and seedling internodes. Results showed that red light given in a photoperiodic dark period reduced the O_2 utilization of the short-day plants by about half, and stimulated that of the long-day plant about fourfold. Red light stimulated the respiration of lettuce seeds about sixfold; it inhibited respiration in the stem of Alaska pea seedlings. Infra-red following brief red light had the opposite effect on respiration in every case. The authors conclude that although the light-perceptive pigment may be the same in each case, the net metabolic effect of the light is not the same. The developmental phenomena may be more closely correlated with the respiratory effects than with the light treatment itself. —Purdue Univ. agric. exp. Stat., Indiana.

40. Khudairi, A. K., and Hamner, K. C.
Effect of ethylene chlorohydrin on floral initiation in *Xanthium*.
Bot. Gaz., 1954, **115**: 289-91, bibl. 8.

Flowering was induced by exposure to gaseous ethylene chlorohydrin in plants of *Xanthium pennsylvanicum* grown continuously under long-day conditions. Control plants grown at the same day-lengths but without the ethylene chlorohydrin treatment remained vegetative. The possible significance of these results is discussed. [Authors' summary]—Univ. Calif., Los Angeles.

Growth Substances

(*See also* 17, 59, 103a, f, g, h, q, u, 104c, e, g, j, 155-157, 159-158, 212, 260, 414m, Weeds and weed control section, 533, 604, 632, 635, 659, 698, 764, 880, 925-927, 957, 1037.)

41. Hemberg, T.
The relation between the occurrence of auxin and the rooting of hypocotyls in *Phaseolus vulgaris* L.
Physiol. Plant., 1954, **7**: 323-31, bibl. 11.

The changes in the auxin content of the upper and lower halves of rooting *Phaseolus vulgaris* hypocotyls were studied: auxin extraction in two stages enabled both free and bound auxin to be estimated. The content of bound acid auxin increased in the entire hypocotyl in connexion with root formation, showing a greater increase in the lower part where most of the roots were formed. Free auxin also showed an increase in relation to rooting, but the rise started later than that of bound auxin. No difference in the increase of free acid auxin in upper and lower parts of the hypocotyl was established, except in one case which showed more vigorous rooting than was normal.—Roy. Pharm. Inst., Stockholm.

42. Shoji, K., and Addicott, F. T.
Auxin physiology in bean leaf stalks.
Plant Physiol., 1954, **29**: 377-82, bibl. 19.

Auxin was produced by excised leaf stalks of Black Valentine beans when immersed in water, but disappeared from the stalks when they were kept in moist air. IAA was not transported through the stalks, although it diffused into the sections. There was evidence of an IAA inactivating system in bean leaf stalks.—Univ. Calif.

43. Goldacre, P. L.
The photochemical inactivation of indoleacetic acid sensitized by non-protein components of plant tissues.
Aust. J. biol. Sci., 1954, **7**: 225-50, bibl. 25.

A study has been made of the IAA-destroying activity of the brei of etiolated pea epicotyls other than that due to the enzyme IAA oxidase. The protein-free dialysate sensitizes the destruction of IAA in the light but not in the dark. Blue-violet light is most effective, followed by blue-green, green, red, and yellow. The kinetic behaviour of the whole dialysate has been studied in detail. The apparent K_s is 3×10^{-4}M and the reaction is first order with respect to IAA. The net pH optimum is 5·5. The temperature optimum is 25° C. at high light intensities. At low light intensities there is no dependence on temperature over the range 8–36° C. It is concluded that there is a photochemical reaction followed by one or more dark reactions. The activity is reduced by heating or by exposing to visible or ultraviolet light. The inactivation of IAA probably involves an oxidation without the intermediate formation of hydrogen peroxide. In the etiolated pea seedling the active material is much more abundant in the buds than in the stems, roots or cotyledons. It is present in higher concentration in etiolated than in green pea seedlings. The dialysate contains at least four active components. A major component depends for its activity on a heavy metal which has not yet been identified. A technique is described for the resolution and detection of the active compounds on paper chromatograms. Preliminary fractionation procedures have been devised.

44. Linser, H.
Zur Wirkungsweise von Wuchs– und Hemmstoffen. IV. Die Konzentrations-Wirkungskurven einiger synthetischer Zellstreckungswuchsstoffe in Gegenwart verschiedener Mengen von synthetischen Hemmstoffen. (**The mode of action of growth substances and growth inhibitors. IV. The concentration activity curve of some cell-elongating growth substances in the presence of various mixtures of synthetic growth inhibitors.**) [English, French and German summaries, ¼ p. each.]
Biochim. biophys. Acta, 1954, **15**: 25-30, bibl. 7.

In each of six different series of experiments one growth substance (indole-3-acetic acid; α-naphthaleneacetic acid; 2, 4, 5-trichlorophenoxyacetic acid) and one growth inhibitor (2, 3, 5-triiodobenzoic acid; 2, 4, 6-trichlorophenoxyacetic acid; 2, 4, 5-trichlorothiophenoxyacetic acid as sodium salt) were mixed together at different concentrations. Using the *Avena*-coleoptile, the cell-elongating activity was measured by the paste-test method. The results—in principle—conform with those found previously with a mixture of IAA and eosin, and indicate that the phenomenon is not specific for this pair of substances but is valid for every combined action of growth substances and growth inhibitors Therefore it can be taken as the basis of a general growth substance hypothesis. [Author's summary.] [See also *H.A.*, 22: 1145.]

45. Ochs, G.
Zur Wirkungweise des Wuchsstoffes auf das Streckenwachstum der Wurzel. (**The mode of action of growth substances on the elongation growth of roots.**)
Planta, 1954, **44**: 412-36, bibl. 48.

The action curves of 6 growth substances were determined by the cress root test.

46. Reinhold, L.
The uptake of indole-3-acetic acid by pea epicotyl segments and carrot disks.
New Phytol., 1954, **53**: 217-39, bibl. 31.

The disappearance of IAA from solutions surrounding segments of pea epicotyls or carrot disks appeared to be separable into 2 processes, one physical and the other metabolic. It is suggested that the active process may be either the metabolism of IAA within the cells or an active transport mechanism effecting the entry of auxin into the cell.

47. Wain, R. L., and Wightman, F.
The growth-regulating activity of certain ω-substituted alkyl carboxylic acids in relation to their β-oxidation within the plant.
Proc. roy. Soc., 1954, **142**: 525-36, bibl. 9, illus.

The plant growth-regulating activities of homologous series of ω-substituted alkylcarboxylic acids and of the corresponding ω-(1-naphthyl)-acids have been assessed in wheat cylinder, pea curvature and tomato-leaf epinasty tests. In most instances an alternation in activity was observed as each series was ascended. With some series, however, although the acetic derivative was active, all higher homologues were inactive in certain tests. The results are discussed and shown to be consistent with a possible degradation of the side-chain of these acids by β-oxidation within the plant tissue. [From authors' summary.]—Wye College.

48. Meljnikov, N. N., Tureckaja, R. H., and Bokarev, K. S.
The structure and physiological activity of some phenoxy-alkyl-carboxylic acid derivatives on plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1953, **90**: 921-3, bibl. 4.

The majority of 63 materials of this nature applied to bean cuttings stimulated root development.

49. Osborne, D. J., and others.
Growth-regulating activity of certain 2:6-substituted phenoxyacetic acids.
Nature, 1954, **174**: 742, bibl. 5.

A series of 2:6 substituted phenoxyacetic acids with alkyl substitutions in the side-chain was tested over a wide concentration-range in the Went pea curvature and *Avena* straight-growth tests. The results show that the compounds have a certain, specified growth-regulating action and can no longer be classified as inactive compounds or as anti-auxins.—Unit exp. Agron., Oxford.

50. Rood, P., and Hamner, C. L.
The use of 4-phthalimido-2, 6-dimethylpyrimidine as a plant growth regulator.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 495-500, bibl. 5, illus.

Experiments have been conducted which indicate that 4-phthalimido-2, 6-dimethylpyrimidine is a new plant growth regulator capable of inducing the parthenocarpic development of tomatoes, of stimulating the rooting of cuttings, and of causing morphological and chemical changes in young bean plants. This is of special interest because the structure of this compound is quite different from that of the auxins, although many of the plant responses are similar. [Authors' summary.]—Mich. State Coll. E. Lansing.

51. Sen Gupta, J. C., and Chattopadhaya, S. K.
Hormones and rooting in intact plants and cuttings.
Curr. Sci., 1954, **23**: 294-5, bibl. 1.

Indolebutyric acid and naphthaleneacetic acid induced rooting when applied in lanolin paste in a ring a little below the tip of the stem or a branch in papaw or tomato, higher concentrations being required in the woody than in the herbaceous plant. In tests with these hormones on cuttings of poinsettia, mango and *Eugenia jambolana* taken in the summer, monsoon and winter seasons and planted in soil or sand NAA induced no response. IBA induced rooting in poinsettia alone, but only during the summer and the monsoon and in the cuttings planted in soil.

52. Mackov, F. F., and Podrazanskaja, B. S.
Growth stimulators as micro-fertilizers. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **95**: 1329-31, bibl. 2.

It had been established earlier that heteroauxin, α-naphthylacetic acid and 2,4-D applied to the soil act as micro-nutrients and increase the effectiveness of mineral fertilizers. In the present work the duration of the activity of these stimulants was studied with oats as test plants.

53. Fang, S. C., and Butts, J. S.
Studies in plant metabolism. IV. Comparative effects of 2,4-dichlorophenoxyacetic acid and other plant growth regulators on phosphorus metabolism in bean plants.
Plant Physiol., 1954, **29**: 365-8, bibl. 13, illus.

With Black Valentine beans it was found that 2,4-D treatments greatly reduced the upward movement of radioactive P to the leaves, the degree of reduction being proportional to the amount of 2,4-D supplied. Treatment with 2,4-D, IAA, IBA, or NAA modified the distribution and accumulation pattern of radioactive P in bean plants.—Oregon State College, Corvallis.

Tissue culture.

(*See also* 70, 103p, w, 104d.)

54. Hildebrandt, A. C., Riker, A. J., and Watertor, J. L.
Growth and inhibition of tissue cultures on media with different concentrations of organic acids.
Phytopathology, 1954, **44**: 422-8, bibl. 14.

The influence was tested of a wide range of concentrations, from 0·015 to 4%, of salts of 16 organic acids on growth of marigold, Paris-daisy, periwinkle, or sunflower crown gall tissue and normal tobacco callus cultures. The acids or salts tested included acetic, citric, formic, fumaric, glutaric, glycolic, lactic, malic, malonic, oxalic, propionic, pyruvic, stearic, succinic, and tartaric acids and calcium gluconate. None of the species was able to grow appreciably on media with any one of the acids as the sole source of carbon. In the presence of 2% sucrose, however, many of the acids were tolerated over a wide range of concentrations. Varying degrees of inhibition, from partial to complete, usually resulted as the concentrations of the acids were increased. There was considerable specificity as to the acid, species, and concentration where stimulation or inhibition appeared. Acetic, formic, or propionic acids inhibited or stopped growth completely of all species even at the lowest concentration used. [Authors' summary.]—Univ. Wisconsin, Madison.

55. LEE, A. E.
Growth patterns of excised tomato roots.
Bull. Torrey bot. Cl., 1954, **81**: 440-6, bibl. 15.

Excised roots of 2 lines of *Lycopersicon esculentum* and a *L. pimpinellifolium* line were cultured and compared on White's standard medium. Growth patterns of the *L. esculentum* lines showed much similarity, although differences between the species were more marked. The relation between lateral growth and stem position was studied and it was shown that the 2 most basipetal segments containing laterals grew best in the *L. esculentum* lines, while with *L. pimpinellifolium* lateral growth was equally good from all the segments. The optimum segment age for growth was found to be 4 days. No correlation was found between the growth of excised tips and the length of the laterals from which they were taken. The best growth was obtained from the tips of laterals between 20 and 60 mm. long.—Univ. Texas.

56. LEE, A. E.
Growth of the main apices of excised tomato roots.
Bull. Torrey bot. Cl., 1954, **81**: 447-54, bibl. 7.

The root apices of 3 tomato lines were repeatedly subcultured and their growth studied. Those subcultured after 1 day showed a greater total amount of growth than those subcultured at longer intervals. In general the growth rate at the beginning of the treatment was higher for roots excised after longer passages, but later growth declined rapidly and roots did not survive more than 21 days. A high percentage of roots of one *Lycopersicon esculentum* line, given a 1 day passage, grew for 60 days without a lessening of the growth rate. In the other *L. esculentum* line all apices died by the 36th day under this treatment. The *L. pimpinellifolium* line showed only very slight increase in survival under this treatment.—Univ. Texas.

57. BOLL, W. G.
Studies on the growth of excised roots. IV. Investigations into the application of the technique of the culture of excised roots to comparisons between strains and hybrids of tomato.
New Phytol., 1954, **53**: 177-203, bibl. 35.

The growth of 6 clones of excised roots, each derived from within an inbred line of tomato, was studied through a series of passages. Both quantitative and qualitative differences were found between the clones. —Univ. Manchester.

58. BOLL, W. G.
Norvaline: a growth factor for excised tomato roots.
Nature, 1954, **174**: 517, bibl. 4.

In nutrition studies on excised tomato roots replacement of pyridoxine by the synthetic amino-acie norvaline gave over 50% of the growth obtained in thd presence of pyridoxine. This tentative evidence that norvaline may be involved in "normal" metabolism and its precise relationship to vitamin B_6 is being investigated.

59. STREET, H. E.
Factors controlling meristematic activity in excised roots. V. Effects of β-indolylacetic acid, β-indolylacetonitrile and α-(1-naphthylmethyl-sulphide)-propionic acid on the growth and survival of roots of *Lycopersicum esculentum*, Mill.
Physiol. Plant., 1954, **7**: 212-30, bibl. 22.

The experiments were carried out on excised tomato roots (Best-of-All), using techniques described in previous papers. Results showed that β-indolylacetic acid reduced the survival of main axis meristems subjected to repeated subculture. β-indolylacetonitrile at concentrations equally inhibitory to growth had little or no effect on survival. The growth response of the roots to α-(1-naphthylmethylsulphide)-propionic acid took the form of an optimum curve, on which marked growth stimulation occurred at the optimum concentration. The author suggests that the retardation of growth and cessation of meristematic activity occurring when excised tomato roots are repeatedly subcultured in standard medium is due to the accumulation at the apex of some natural hormone to a critical supra-optimal concentration.

60. BAUSÁ ALCALDE, M.
Influencia de los azucares en el cultivo "*in vitro*" de raices aisladas de berenjena. **(The role of sugars in the culture of excised eggplant roots *in vitro*.)**
An. Edaf. Fis. veg. Madrid, 1954, **13**: 601-23, bibl. 33, illus.

Investigations showed that (1) excised roots of eggplant can survive indefinitely in WI (White) medium; (2) the sugar in the medium is the factor governing the performance of the roots; (3) the most suitable sugars for the culture of eggplant roots are glucose and levulose.

61. BÜNNING, E., AND WELTE, H.
Photoperiodische Reaktionen an pflanzlichen Gewebekulturen. **(Photoperiodic reactions of plant tissue cultures.)**
Physiol. Plant., 1954, **7**: 197-203, bibl. 9.

Carrot tissue, cultured in test tubes, showed greater growth under long-day than under short-day conditions. In short days, an interruption of the dark period by 2 hours light, i.e. conditions approximating to long days, also gave an increase in growth. Even in long days under a reduced light intensity the growth of the tissues was greater than under short-day conditions with high light intensity. The authors suggest that the phase which promotes growth in light is apparently identical with the phase in which the tissue reaches its endogenous growth maximum. As in other long-day plants there is also a secondary growth maximum occurring in the daily light period.

62. SUTCLIFFE, J. F.
The exchangeability of potassium and bromide ions in cells of red beetroot tissue.
J. exp. Bot., 1954, **5**: 313-46, bibl. 32.

In experiments using radioactive tracers, it was shown that red beetroot cells contained a certain amount of easily exchangeable K and Br ions. The author suggests that these ions are distributed throughout the intercellular spaces, cell walls, and in parts of the protoplasm, whilst those which do not readily exchange may be situated in the cell vacuoles, or else strongly associated with protoplasmic constituents.—King's College, London.

63. Weatherley, P. E.
Preliminary investigations into the uptake of sugars by floating leaf disks.
New Phytol., 1954, **53**: 204-16, bibl. 8.

Leaf disks of *Atropa belladonna* were used in most of a number of experiments on sugar absorption measured as an increase in dry weight. The rate of uptake and final weight increased with the external concentration of the sucrose solution. Sugar appeared to enter through the cut edges rather than through the surface of the disks. Transpiration from the disks increased the rate of sugar uptake.—Univ. Nottingham.

Seed problems.

(*See also* 103r, 496-501, 550-552, 710, 711, 857, 858, 865, 877, 884a.)

64. Lakon, G.
Die Verwendung einer kombinierten Tetrazoliumlösung in der topographischen Keimprüfung. **(The use of a combined tetrazolium solution in topographical seed testing.)**
Saatgut-Wirtsch., 1954, **6**: 207-8, bibl. 1.

The tetrazolium solution used in seed testing is liable to reduction by microorganisms which invalidates results. The addition of 0·01% Preventol 115 (Farbenfabriken Bayer) to the solution prevented bacterial infection without affecting germination.

65. Lowig, E.
Beiträge zur Frage der Saatgutlagerung. **(Contributions to the problem of seed storage.)**
Saatgut-Wirtsch., 1953, **5**: 148-50 and 1954, **6**: 124-7, illus.

Data are tabulated on (1) the germination percentage of *Viola tricolor* seed stored in a heated room in (*a*) bags or wooden boxes and (*b*) air-tight containers over quicklime; (2) the water content of the seeds at the conclusion of the experiment; (3) the water content of dwarf bean seed stored for 6 months in 4 localities of different air humidity; (4) the water absorption of *Viola tricolor* and tomato seed stored in bags of 3 different materials. The results emphasize the importance of storing seeds under conditions of very low humidity; even the moisture content of the gum of paper packets has to be taken into consideration. The air of the storage room should be dried over quicklime.

66. Calver, J. L., and others.
Symposium: sources and rates of liming.
Proc. Soil Sci. Soc. Fla., 1951, 1951, **11**: 56-96, bibls.

Papers are included on "Effects of lime on plant nutrient efficiency", "The lime requirements of vegetable crops on the sandy soils of the lower east coast of Florida", "The use of agricultural limestone and dolomite in Florida citrus production" and "The lime requirements of ornamentals".

67. Reinhold, J.
Der Einfluss verschiedener Verfahren der Desinfektion von Komposten auf deren pflanzenaufbaulichen Wert. **(The effect of different methods of sterilization on the horticultural value of compost soils.)**
Arch. Gartenb., 1954, **2**: 236-60, bibl. 9.

Ten methods of sterilizing compost soils prepared from vegetable wastes were compared with reference to their influence on the physical, chemical and biological characteristics of the soil and its manurial value. In pot and field trials with spinach, steaming (at 95° C. for 15 minutes) gave the best results, followed in descending order by formaldehyde (12 litres of a 2% solution per $m.^3$), borax (1 kg. per $m.^3$) and carbolineum (10 litres of a 10% emulsion per $m.^3$). Calcium cyanamide (1·46 kg. per $m.^3$) improved yields but had no sterilizing action. The effect of all the treatments on availability of nutrients, plant growth, black leg and weed control is discussed in detail.—Inst. f. Gemüsebau, Humboldt-Univ., Berlin.

68. Afzal, M.
A study of natural and synthetic soil stabilizers.
Diss. Abstr., 1954, **14**: 575, being *Publ.* 7915 of 125 pp.

In a loess soil, soil stability was increased by adding resin 3074, vinyl polymers, cellulose derivatives or wheat straw. CRD–189 lost its major effect on soil stability within a year after alternate wetting and drying, although the effect persisted in the field. Six weeks after application CRD–189 had had no effect on the soil fungi, although the numbers of actinomycetes and bacteria had increased; in krilium-treated soil the numbers of soil fungi, actinomycetes and bacteria decreased, whereas they increased under a straw mulch. In a silty clay loam water evaporation was decreased for a few weeks by mixing CRD–189 with the soil.

69. Dimock, A. W.
Chloropicrin fumigation and the new plastic covers.
Bull. N.Y. St. Flower Grs., 1954, No. 107, p. 4.

Several new plastic covering materials are available, the use of which makes it possible to obtain as good soil sterilization and weed control with chloropicrin as with steam.

Nutrition and manures.

(*See also* 103d, i, l, o, x, 104b, h, i, 261, 262, 479, 535-537, 574-576, 618, 662-668, 984, 1113.)

70. Ozaki, C. T.
Role of research in a soil testing program. C. Some important uses of tissue testing.
Proc. Soil Sci. Soc. Fla., 1953, 1954, **13**: 143-6, bibl. 19.

The uses briefly discussed are determination of the causes of physiological disorders, interpretation of results of fertility experiments, establishing a fertilizer programme and as a guide to establishing suitable soil tests.

71. Purvis, E. R.
Commercial use and importance of heavy plant nutrients.
Agric. Chemls., 1954, 9 (11): 36-8, 129-31.

Short notes are given on the occurrence of soil deficiencies of heavy metals in the U.S.A. Iron deficiency occurs most widely, having been reported from 32 states. Copper deficiency is reported from 16 states, mainly on peat soils; the situation in Florida is the most serious and more nutrient sprays are used there than in all other states. Twenty-two states have reported Mn deficiency, which generally occurs on overlimed soils of the east and alkaline soils of the west. Recently reports of Mo-deficient soils have been received from 11 states, and zinc is reported as deficient in soils of 26 states. At present applications are heavier than plant requirements but foliar spraying and the use of chelates should help to reduce the gap.

72. Žurbickiĭ, Z. I., and Vartapetjan, S. M.
The influence of boron on the movement of nutrient elements in plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **96**: 1249-51, bibl. 2, illus.

Oats, cabbage and tomato were grown in sand culture with and without B for 1 month. When radioactive P^{32} was applied for 1 hour, it was found that P, while absorbed by the roots of all the plants, was translocated much better in those receiving B. The most marked effect of B was noted in the tomato seedlings, the leaves of which contained 3–4 times as much P when B was supplied as when it was omitted.

73. Antognini, J.
Iron chelates control iron chlorosis.
Agric. Chemls., 1954, 9 (11): 47-9, 131, bibl. 18, illus.

The author surveys recent work in the U.S.A. on the use of chelates to correct iron deficiencies of ornamentals, citrus and deciduous fruits, and vegetables. Iron deficiency was corrected in pears in California by an iron chelate spray at 0·02% Fe. Chelate effectiveness was not reduced when it was applied with dolomite, 20% superphosphate or triple superphosphate at a rate of 5 lb. a tree. The residual effect of iron chelate persisted for 2 to 12 months, depending on soil pH and plant growth.

74. Perkins, H. F., and Purvis, E. R.
Soil and plant studies with chelates of ethylenediaminetetraacetic acid.
Soil Sci., 1954, **78**: 325-30, bibl. 13, illus.

Experiments were conducted to determine the effects of sodium EDTA and manganese EDTA in soils and plants. Heavy applications of sodium EDTA to soils resulted in a greater increase of extractable Fe than of extractable Mn, Ca, Mg or K. Available P was increased only at the highest, viz. 5,000 lb. per acre treatment. Soil pH values were not influenced. Applications of manganese EDTA at 4·2 lb. Mn per acre to soil subjected to 6 wetting-and-drying periods, resulted in a marked increase in water-soluble and exchangeable Fe, and a marked decrease in water-soluble and exchangeable Mn. Fe in the soil replaced Mn of the manganese EDTA complex and was easily leached from the soil. Tomato plants grown in a greenhouse in a high-pH, low-Mn soil did not respond to applications of manganese EDTA at 5 lb. Mn per acre. Ten and 25 lb. of chelated Mn per acre reduced tomato yields; K uptake was increased at both of these levels of Mn, and that of Mg at the 25 lb. level. Sunflower plants receiving sodium EDTA as the only source of added N made more growth than did those receiving no N. On the basis of N units, EDTA was less effective than sodium nitrate in promoting growth. [From authors' summary.]—N.J. agric. Exp. Stat.

75. Voblikova, T. V.
The effect of phosphorus mist on plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **96**: 833-5, bibl. 3.

The smoke generated by red phosphorus for frost protection of citrus is harmless to the plants and the possible nutritive value of this mist was studied with beans as test plants. Between germination and flower bud formation 16 mist treatments were applied. Grown on an enclosed plot 1·75 sq. m. in area the plants were watered immediately after sunset, covered with tarpaulin and submitted to mist produced by 1·5 g. phosphorus. Yields of seed harvested from the treated plants were 78% higher than those from the controls and the total dry matter produced was also greatly increased.

76. Latzko, E.
Einfluss von Cl^-- und SO_4^{--}-Ernährung auf die Enzymtätigkeit von Kulturpflanzen. **(The effect of Cl^- and SO_4^{--} nutrition on the enzyme activity of cultivated plants.)**
Z. PflErnähr. Düng., 1954, **66**: 148-55, bibl. 25.

In comparison with chloride fertilizers sulphates increased the activity of carbohydrate-decomposing enzymes. Chlorides were shown to depress the activity of hydrolytic enzymes. Spinach and dwarf beans were among the experimental plants.—Inst. AgrikChem. tech. Hochschule München, Weihenstephan.

77. Saburov, N. V.
Improving the quality of vegetables and fruits. [Russian.]
Priroda, 1954, **43** (9): 42-6.

On experimental stations of the Moscow agricultural academy fertilizer trials were conducted on cabbage, cucumber, tomato, cauliflower, lettuce, black currant and strawberry. Types of macro- and micro-nutrients, and rates and methods of application which improved the quality of the respective crops and produced high yields are given. The elements I, Fe and Ca are discussed, with reference to their importance for human nutrition, their occurrence in vegetables and methods of increasing the amount of these nutrients in plants.

78. Muller, J.
Diffusion et migration des éléments fertilisants introduits sous forme de produits granulés. **(The spread and dispersal of fertilizing elements applied in granular form.)**
Ann. agron., 1954, **5**: 339-48, bibl. 3.

The behaviour of a granular fertilizer containing nitrate of ammonia, potassium chloride and superphosphate was studied in the laboratory. The elements were rapidly dissolved in the water of the medium in which the pellets were placed, so that each pellet was surrounded by a concentrated solution. The nitrate of ammonia and potassium chloride were more or less rapidly dispersed according to the moisture available, but the dispersal of phosphoric acid in the soil was limited.

79. Jacob, K. D.
Status and problems of fertilizer-pesticide mixtures.
J. agric. Food Chem., 1954, **2**: 970-6, bibl. 60.

The author reviews the present status of fertilizer-pesticide mixtures and discusses some problems of their manufacture and use. The present mixtures in use in the U.S.A. are mainly solid products containing one insecticide for soil insect control. They have been recommended or approved in 26 states, but usually with reservations until further experiments have been made. The principal insecticides used are aldrin, heptachlor, chlordan, dieldrin and DDT; the fertilizers generally contain 2 or more primary plant nutrients. A major problem of fertilizer-pesticide application is to supply the desired quantities of each on an acre basis; the time of application can generally be satisfactorily arranged.

80. Kick, H.
Vegetations- und Feldversuche zur Stickstoffwirkung einiger aus städtischen Abfällen hergestellter Dünger. **(Pot and field trials on the action of nitrogen in various composts prepared from town wastes.)**
Z. PflErnähr. Düng., 1954, **66**: 132-42, bibl. 12.

In several years' trials with agricultural crops proprietary composts prepared from town wastes were compared with stable manure as sources of nitrogen. Two of the composts tested, Müllohum and Vitatum (analyses specified), almost equalled stable manure in manurial value.—Landw. Hochschule, Hohenheim.

81. von der Waydbrink, W.
Über die Bedeutung einiger Faktoren für die Zersetzung und Umwandlung eines Buchenwaldrohhumus in eine gärtnerisch nutzbare Erde. **(On some factors governing the preparation of a horticultural compost soil from the crude humus of a beech forest.)**
Arch. Gartenb., 1954, **2**: 273-310, bibl. 28, illus.

Temperature was shown to have the greatest influence on decomposition of the humus, a rise of 10° C. between 10° and 40° C. doubling the rate of CO_2 production. The formation of CO_2 was rapidly increased also by liming to raise the pH value to 5–5·5. Other factors studied were moisture, aeration and the addition of major and minor nutrients.

82. Anon.
Un nouvel auxiliaire de l'arboriculture—l'Humauby. **(A new aid to tree culture—Humauby.)**
Arboric. fruit., 1954, Nos. 6-7, pp. 21-2.

The treatment of peat to form the basis of a new humus manure, Humauby, is described.

Irrigation.

(*See also* 187, 206a, 239, 512, 513, 634, 1090-1093.)

83. Fuhriman, D. K.
Sprinkler irrigation-labor costs and effectiveness studied.
Fm. Home Science, 1954, **15**: 32-3, 45-6, illus.

Studies on a small number of Utah farms in 1953 showed that labour requirements for sprinkler irrigation varied between 0·05 to 0·32 man hours per acre-inch of water applied. Figures from other Western States tended to be higher, particularly in California. It was also shown that water losses from evaporation and wind drift amounted to 10% with one system operating during the early morning; from the same system operating about midday losses amounted to 40% of the water applied.

84. Hansen, V. E.
Determination of water flow from gated pipe.
Agric. Engng. St. Joseph, Mich., 1954, **35**: 496-7, illus.

A description is given of an inexpensive, accurate and convenient method of controlling and measuring water distributed on furrow irrigated experimental plots by gated pipe.

85. Kimbrough, E. A., Jr.
Screen may help moss problem in irrigation ponds.
Miss. Fm Res., 1954, **17** (4): 1-2.

A hardware cloth screen, designed to prevent stoppage of the suction strainer of irrigation pumps by algae, is described.

Glass and glass structures.

(*See also* 1149.)

86. Leach, A.
Light transmission of greenhouse glass and glass substitutes.
Bull. N.Y. St. Flower Grs., 1954, No. 108, p. 2.

In a recent test a German glass, Klarglass, transmitted approximately the same amount of total light as did ordinary greenhouse glass, whereas 2 types of a plastic material, Corrolux "85" maxlite, transmitted 15 to 37% less total visible light.

87. Nisen, A.
Le verre, matériau de construction en horticulture. **(Glass as horticultural construction material.)** [English summary, ½ p.]
Bull. Inst. agron. Gembloux, 1954, **22**: 31-51.

Preliminary results are given of a series of experiments aimed at assessing the value of several methods of using glass in horticulture. Temperatures and plant yields were related to those under ordinary glass, 3 mm. thick. Under hammered glass the temperature was slightly lower and plant weight slightly less than in the controls. Temperature under double glass increased with efficiency of the sealing method used. Radishes gave greatest plant weight under double glass hermetically sealed; the weight of lettuces was greatest under double glass sealed with putty.

88. ANON.
And now the "Venticult 3".
Comm. Gr, 1954, No. 3066, p. 647, illus.

A brief description is given of a new barn cloche, evolved from an earlier model [*H.A.*, 23: 3767], which has been designed to facilitate handling and control of ventilation. With additional brackets and glass, the height of the cloche can be increased to 20 inches to accommodate relatively tall crops such as tomatoes.

89. VAN KEULEN, W., AND VAN DER HELM, G. W.
Verrolbare kassen. I. De constructie van verrolbare kassen. II. Het gebruik en de kosten van verrolbare kassen in de Veenstreek. **(Movable glasshouses. I. The construction of movable glasshouses. II. The use and cost of movable glasshouses in the Peat District.)** [English summaries, ½ p. and ⅓ p.]
Meded. Dir. Tuinb., 1954, **17**: 659-68, illus.

Four types of glasshouse wholly movable or with a removable roof are described. Well-constructed houses must have strong joists, good drainage, and exactly horizontal wheel axles. Dutch light structures moving on permanent rails are used in the Peat district of N. Holland on mixed cut flower and vegetable holdings. The cost of construction and upkeep are somewhat higher than for permanent glasshouses but high returns more than compensate for this.

Apparatus and devices.

(*See also* 103c, e, k, s, v, y, 104f, 185, 236, 252, 529, 530, 630, 1163.)

90. MONSEN, H., AND BOULDIN, R. F.
Semiautomatic device for washing tissues.
Science, 1954, **120**: 673-4, illus.

The aim of the rack is to facilitate the handling of tissue specimens which need prolonged washing after fixation. —Dep. Anat. Coll. Med., Univ. Ill. Chicago.

91. JENSEN, W. A.
The application of freeze-dry methods to plant material.
Stain Tech., 1954, **29**: 143-50, bibl. 8, illus.

The freeze-dry method of preparing tissue for histological observation has been applied to a large variety of plant material with good results. This method involves freezing the tissue rapidly and dehydrating at a temperature below −30° C. under vacuum with a desiccant. The tissue, when dry, is infiltrated with paraffin under vacuum. The apparatus uses a liquid nitrogen-cooled condenser as the desiccant and the tissue is infiltrated with paraffin while in the original vacuum. Using root, stem, leaf, and reproductive tissue of common experimental species such as *Vicia faba*, *Zea mays*, *Lilium longiflorum*, *Pisum sativum* and *Phaseolus vulgaris*, the effect of thickness on drying time was studied. It was found that there was greater difference between types of tissue than between species so that, regardless of species, leaf tissue was easiest and root tips the most difficult to freeze and dry. Leaf segments required 1-2 days to dry while root material required 6 days or more. In all tissue except leaf, 1-2 mm. segments were optimal for freezing and drying although 4 mm. segments could occasionally be used. [Author's abstract.]—Calif. Inst. Tech., Pasadena.

92. SCHLEGEL, D. E., AND RAWLINS, T. E.
Improved homogenizer for plant tissues.
Science, 1954, **120**: 667-8, bibl. 5, illus.

The glass mortar consists of a 12-ml. heavy walled conical centrifuge tube; the pestle is plastic with a steel shaft. It is motor-driven and works best if the sample sizes are kept to 500 mg. or less. A 300-mg. sample of leaf discs from the interveinal area of tobacco leaves can be completely macerated in about 30 secs.—Dep. Plant Path., Univ. Calif., Berkeley.

93. PERRY, J. S.
A plastic lacquer substitute for coverslips.
Quart. J. microscop. Sci., 1954, **95**: 159-61.

A plastic lacquer manufactured by Cellon Ltd. has been found useful for covering sections on glass slides of any size. It takes the place of both mounting medium and coverglass and saves storage-space. The method has proved particularly valuable in mounting large series of sections and serial sections of large specimens. Its use in conjunction with bulk staining techniques is described. The lacquer is very clear and has not been found to deteriorate on the slide after several years. [Author's summary.]—Lab. agric. Res. Coun., Compton, Berks.

94. GARNIER, B. J., AND LEWIS, W. V.
Potential evapo-transpiration: an appeal for its measurement.
Weather, 1954, **9**: 243-5, bibl. 3, illus.

A diagram is provided of the simple apparatus described earlier [*H.A.*, 23: 121i] which is designed to measure evapo-transpiration. Several of these units installed in Nigeria and elsewhere are working satisfactorily. The need for recording evapo-transpiration as a factor of climate is discussed.

95. FRITTS, H. C., AND FRITTS, E. C.
A new dendrograph for recording changes in the outer radius of a tree.
Abstr. in *Bull. ecol. Soc. Amer.*, 1954, **35**: 60.

A new dendograph designed to measure a single outer radius of a tree was developed and tested. The instrument operates on essentially the same principle as a dial-gauge dendrometer except that it is equipped with a constant recording mechanism. The dendrograph is mounted kinematically on three lag screws, inserted into the xylem of the tree. A simple lever system magnifies the differential movement between the screws and the outer surface of the bark one hundred times and records the movement on a standard Friez rain-gauge clock. [Authors' abstract.]—Ohio St. Univ.

96. BENEDICT, W. G., AND MOUNTAIN, W. B.
Aluminum foil planting boxes for greenhouse experiments.
Canad. J. agric. Sci., 1954, **34**: 432-3, bibl. 1, illus.

Small, watertight, aluminum foil planting boxes arranged in metal trays were used to advantage in increasing the number of treatments and replications in studies involving the use of standard Wisconsin soil-temperature tanks. [Authors' abstract.]

97. Wells, J. S.
Propagating tools.
Amer. Nurserym., 1954, **100** (7): 14-15, 49-53, illus.

Knives for making cuttings and grafts are discussed and illustrated descriptions are given of a 4-razor-blade wounding tool for cuttings, a draw blade cutter for producing even cuts on both stock and scion used primarily for propagation of lilacs grafted on privet, a general scion cutter and a potting machine to make a ball of soil around the roots of seedlings or rooted cuttings.

98. Anon.
New pot cleaner.
Comm. Gr, 1954, No. 3066, p. 647.

A new electrically-driven machine has been developed by the Midlands Electricity Board in co-operation with Stoke-on-Trent Corporation Parks Department which will clean both the inner and outer surfaces of flower pots at a rate of more than 1,000 pots an hour. The machine costs about £50.

99. Anon.
Simpler plant irradiator.
Comm. Gr, 1954, No. 3066, p. 635, illus.

A brief account is given of the Sieray Plant Irradiation Unit, a new 200 watt lamp which combines a murcury vapour discharge source and a tungsten filament and which can be used direct from 200–250 volt mains without a transformer or reflector. Suspended 3 ft. above a bench it is effective over an area 3 ft.×4½ ft. Its cost with holder and suspension link is 79s. 6d.

100. Anon.
A mobile source of electrical energy.
Amer. Fruit Gr, 1954, **74** (8): 14, illus.

An experimental electrical generating system, mounted as a tractor attachment, has been designed to drive electric motors on trailing or tractor-mounted farm machines. The generator may also provide portable field lighting for night work.

101. Anon.
Spraying cuts transplanting risk.
Comm. Gr, 1954, No. 3065, p. 589.

The uses of a new plastic coating, which has been on trial for 2 years, are described. It can be used as a dip or spray to reduce moisture loss during transplanting of seedlings, cuttings, bedding plants, nursery stock or small trees in foliage. It will also help to preserve most types of cut flowers. When used as a preservative coating for apples and other fruits in storage, the substance decreases moisture loss and shrivelling and imparts a glossy sheen which is completely tasteless.

102. Thompson, W. S.
End diffusion method of treating fence posts.
Miss. Fm Res., 1954, **17** (2): 3, 6, illus.

The end-diffusion method of treating fence posts consists in standing green, unpeeled posts small end down in a container holding the preservative solution; when one-third of the solution has been absorbed the posts are reversed and the large ends allowed to absorb the remaining solution. The preservative recommended is a 50% solution by weight of zinc chloride. The results obtained so far indicate that this method of treatment does not give such a long service life as other popular methods, but is suitable for on-the-farm use because of its simplicity, speed and cheapness. A service life of from 8–10 years may be expected provided the proper procedure [here described] is followed. With the possible exception of hickory, white oak, willow and cottonwood, post species common to Mississippi can be treated by this method.

Noted.

103.

a Åberg, B.
Studies on plant growth regulators. IX. Para-alkyl-phenoxy-acetic and -propionic acids, and some related derivatives of naturally occurring phenols.
Physiol. Plant., 1954, **7**: 241-252, bibl. 13.

b Adams, J. C., and others.
50 years of research at the North Plate Experiment Station.
Circ. Neb. agric. Exp. Stat., **93**, 1954, pp. 32, illus.
Including ornamental and small fruit breeding.

c Anon.
La stérilisation des terres horticoles par chauffage électrique dans un four. **(Sterilization of horticultural soils by electrical heating in an oven.)**
Rev. hort. Paris, 1954, **126**: 1132-3.

d Anon.
L'urée, son utilisation en horticulture en ce qui concerne plus particulièrement la pulverisation du feuillage au titre d'engrais azoté. **(Urea, its use in horticulture, with special reference to foliar sprays for nitrogen nutrition.)**
[*Mimeo.*] *Serv. Hort. Rabat.* undated, pp. 13, bibl. in text.
A review.

e Berthet, J.
Une méthode d'enregistrement continu de la radioactivité au cours de chromatographies. **(A method for the continuous recording of radioactivity in chromatographs.)** [English, French and German summaries, ¼ p. each.]
Biochim. biophys. Acta, 1954, **15**: 1-11, bibl. 3.

f Boll, W. G.
Investigations into the function of pyridoxin as a growth factor for excised tomato roots.
Plant Physiol., 1954, **29**: 325-31, bibl. 11.
As used in tissue culture.

g Bonde, E. K., and Khudairi, A. K.
Further experiments with a growth inhibitor extracted from *Xanthium* leaves.
Physiol. Plant., 1954, **7**: 66-71, bibl. 2.

h Bryan, W. H., and Newcomb, E. H.
Stimulation of pectin methylesterase activity of cultured tobacco pith by indoleacetic acid.
Physiol. Plant., 1954, **7**: 290-7, bibl. 12.

i Carnes, G.
Try a chelating agent.
N.J. Agric., 1954, **36** (4): 8-9, 11, illus.
Iron deficiency control with EDTA.

j Centrum voor Landbouwdocumentatie, Wageningen.
Agriculture in the Netherlands (publications in the English language).
Literatuurlijst, volgnummer **479**, 1954, pp. 12.

k Chayen, J., and Miles, U. J.
Preparing plant root tip cells for microscopical examination.
Stain Tech., 1954, **29**: 33-9, bibl. 13, illus.

l Ebert, D.
Ein Beitrag zur Prüfung der Düngerwirkung mittels der "Anwelkmethode". **(Testing the action of fertilizers by means of the "wilting method".)**
Z. PflErnähr. Düng., 1954, **66**: 142-8, bibl. 4.
For a brief note on Arland's wilting method see *H.A.*, 24: 3373.

m Ehrenberg, M.
Einfluss verschiedenen Licht-Dunkelwechsels auf die Rhythmik der Phosphataseaktivität in den Blättern von *Kalanchoë Blossfeldiana.* **(The effect of varying light-darkness changes on the rhythm of phosphatase activity in the leaves of *Kalanchoe blossfeldiana*..)**
Planta, 1954, **43**: 528-36, bibl. 17.

n Georlette, R.
Essai historique sur les haies servant à la clôture des biens ruraux en Belgique. **(Historical essay on hedges enclosing rural estates in Belgium.)**
Ann. Gembl., 1954, **60**: 171-84, bibl. 36.
Including the more common plant species used.

o Geraldson, C. M., and Spencer, E. L.
Factors affecting calcium utilization by plants.
Proc. Soil Sci. Soc. Fla. 1953, 1954, **13**: 155-8, bibl. 13.

p Gustafson, F. G.
Synthesis of B vitamins by excised parts of white lupine seedlings grown in sterile culture.
Arch. Biochem. Biophys., 1954, **52**: 190-6, bibl. 11.
Excised roots, hypocotyls and epicotyls in presence of oxygen.

q Hasman, M.
The effect of 6-aminoundecane and di-n-amylacetic acid on the water absorption, suction potential and permeability of plant parenchymes.
Physiol. Plant., 1954, **7**: 231-40, bibl. 11.
On beet roots and potato tubers.

r Hudson, J. P.
Sowing seeds in boxes.
Grower, 1954, **42**: 872-3, 875, illus.
The first of a series of articles on this subject by the Head, Dep. Hort., School of Agric., Nottingham Univ.

s Jacks, H., and Lidgard, T. P.
New apparatus for high pressure steaming of soil.
[*Publ.*] *Plant Dis. Div., D.S.I.R., N.Z.* [undated], p. 1, illus.

t Korbobo, R. P.
Some techniques in teaching horticulture on TV.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 501-2.
The sketch pad and the flannel board.

u Kraus, E. J.
The significance of growth regulators in agricultural practice.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 529-46, bibl. 64.

v Loveday, D.
Apparatus for the determination of high concentrations of methyl bromide in fumigation.
J. Sci. Food Agric., 1954, **5**: 376-81, bibl. 3, illus.

w Naylor, J., Sander, G., and Skoog, F.
Mitosis and cell enlargement without cell division in excised tobacco pith tissue.
Physiol. Plant., 1954, **7**: 25-9, bibl. 12, illus.

x Polley, J. R.
Colorimetric determination of nitrogen in biological material.
Analyt. Chem., 1954, **26**: 1523-4, bibl. 4.

y Schuffelen, A. C., Lehr, J. J., and Rosanow, M.
The technique of pot experiments.
Reprinted from *Trans. int. Congr. Soil Sci.*, Dublin, 1952, Vol. II, pp. 263-8, bibl. 8, illus.
For study of general problems of plant nutrition.

z Smith, H. H., and Lotfy, T. A.
Comparative effects of certain chemicals on *Tradescantia* chromosomes as observed at pollen tube mitosis.
Amer. J. Bot., 1954, **41**: 589-93, bibl. 23, illus.

104.

a Sporne, K. R.
Statistics and the evolution of dicotyledons.
Evolution, 1954, **8**: 55-64, bibl. 13.

b Stalé, J., and Bovay, E.
La carence de manganèse chez les végétaux. **(Manganese deficiency in plants.)**
Rev. romande Agric. Vitic., 1954, **11**: 85-7, bibl. 9, illus.

c STOWE, B. B., AND THIMANN, K. V.
The paper chromatography of indole compounds and some indole-containing auxins of plant tissues.
Arch. Biochem. Biophys., 1954, **51**: 499-516, bibl. 51.

d VOLK, G. M.
Objectives of soil and tissue analysis.
Proc. Soil Sci. Soc. Fla, 1953, 1954, **13**: 89-100, bibl. 16.

e WEBBER, E. R.
Maleic hydrazide to control growth of plants.
Grower, 1954, **42**: 573, 575, illus.
Horticultural applications reviewed.

f WILLIAMSON, C. E.
Is your soil-steaming adequate?
Bull. N.Y. St. Flower Grs, 1954, No. 107, pp. 2-3.
Results and discussion of 2 trials using plastic covers.

g WILSON, C. M., AND SKOOG, F.
Indoleacetic acid induced changes in uronide fractions and growth of excised tobacco pith tissue.
Physiol. Plant., 1954, **7**: 204-11, bibl. 13.

h YOE, J. H., AND GROB, R. L.
Colorimetric determination of boron with tetrabromochrysazin.
Analyt. Chem., 1954, **26**: 1465-8, bibl. 13.

i YUEN, S. H., AND POLLARD, A. G.
Determination of nitrogen in agricultural materials by the Nessler reagent. II. Microdeterminations in plant tissue and in soil extracts.
J. Sci. Food Agric., 1954, **5**: 364-9, bibl. 5.

j ZUKEL, J. W.
Maleic hydrazide, a plant growth inhibitor.
Agric. Chemls, 1954, **9** (10): 46-7, 113-14, bibl. 35, illus.
A summary of work done.

TREE FRUITS, DECIDUOUS.

General.

(*See also* 206f-i, s, v, 746, 885, 1148, 1152, 1158, 1160, 1168, 1169, 1170, 1179.)

105. FOLLEY, R. R. W., AND ROWE, A. H.
New light on apple yields in Kent.
[*Mimeo.*] *Dep. agric. Econ. Wye Coll.*, 1954, pp. 26, bibl. 2, 2s. 6d.

Annual yields of the more important dessert and culinary varieties grown in the major production areas of Kent were obtained between 1948 and 1952 from 52 growers representing 2,122 acres of orchard. The average yield movements over the 5 years showed that, in general, culinary varieties cropped more regularly than dessert varieties; one year in the 5 was a good year, and one was a bad year, while in the remaining 3 years varietal gains and losses produced intermediate average crops. Figures for the mean yields per acre showed that the most frequent average for dessert apples was between 251–350 bushels, and for culinary varieties 451–550 bushels. Mean yield figures also emphasized how much easier one variety is to grow than another. The mean yield per acre was shown to be increasing by 1% per year as a result of several conflicting movements culinary yields rising while dessert yields have tended to drop: such trends, however, varied in different localities and with different varieties. The weather appeared to have a moderating influence upon yields over a term of years, but its importance at the critical time for fruit setting was emphasized. A survey of Bramley's in mid-Kent showed that the yield per tree increased with a decrease in the number of trees per acre, but the highest yields per acre were from medium-spaced trees. The author concludes that after the upper limit to the average annual yield is reached, with the help of spraying and manuring, there is still opportunity to increase the average yield by improving regularity of bearing.

106. READ, F. M.
Canning fruits in the Goulburn Valley.
J. Dep. Agric. Vict., 1954, **52**: 309-16, illus.

Peaches, pears and apricots grown for canning are very important crops in the Goulburn Valley, Australia's largest irrigation area. An orchard census has been made which includes tree age and health, thus future production can be estimated. Frequent light irrigations, even on shallow soils, have given increased yields. Three promising soil management systems for peaches are: no cultivation, but using an oil herbicide; straw mulching; and a permanent sward of white clover.

107. LAUBER, H. J.
Ein Blick in eine norwegische Obstplantage. **(A glance at a Norwegian orchard.)**
Produktionstechnik in einer norwegischen Obstplantage. **(The technique of fruit production in a Norwegian orchard.)**
Schweiz. Z. Obst-u. Weinb., 1954, **63**: 399-402, illus., and *ibidem*, 1954, **63**: 476-80, illus.

Methods of fruit production used by a progressive grower north-west of Oslo are described. Bush apple trees are stated to thrive there without pruning.

108. FJÄDERHANE, A. M.
Arbetsforbrukningen i fruktodlingen. **(Labour requirements in fruit growing.)**
Medd. Alnarpsinst. Trädgårdsavd. trädgårdsekon. Byrån, **16**, [undated], pp. 27.

Labour requirements in fruit growing were studied in the province of Skåne, Sweden. Data are given on the seasonal distribution of men, women and tractor hours for maintenance (pruning, etc.), planting, harvesting, soil cultivation, transport and various operations. [Actual costs are not considered.]

109. HEIBER, H.
Arbeitsaufwand und Kostengestaltung in Apfelniederstammanlagen der Nordrheinprovinz. **(Costs and labour requirements in bush apple orchards of the North-Rhine Province [Germany].)**
[*Mimeo.*] *Inst. Obstbau Univ. Bonn.*, 1954, pp. 74, bibl. 38.

The survey is based on the journal entries of 21 progressive growers in the North-Rhine Province of Germany, owning between them about 85,000 bush apple trees on about 126 hectares. The average labour requirement per year amounted to 1,052 man-hours per hectare (harvesting 29%, marketing 20%, pruning 16%, soil cultivation 13%, plant protection 9%). Tractor hours (calculated for an 11 h.p. diesel tractor) averaged 89 per hectare and annual costs DM 3,441.–, split up into (1) capital expenditure (24%, 70% of which is allowed for depreciation) and (2) expenditure on labour and materials (76%). The major items under (2) were plant protection (17%), manuring (10%), harvesting (13%) and marketing (12%). Of the cash expenditure 47% was paid out in wages, 41% for materials and 12% for tractor work. The effects on costs of wages and yields are also discussed.

110. ANON.
"Naar beter fruit." (**[Experimental fruit farm] "Towards better fruit".)**
Fruitteelt, 1954, **44**: 726-8, illus.

A short report is given of the new experimental fruit farm at Numansdorp [south-west Holland]. The oldest trees are now only in their sixth season of growth, hence no results can be given. Trials under way include cultural and varietal trials with apples, pears, plums, strawberries, and red and black currants.

111. BIRKELAND, C. J.
An apple improvement program.
Trans. Ill. St. hort. Soc. for 1953, 1954, **87**: 88-95.

An outline is given of fundamental research on apple in progress at the Department of Horticulture, University of Illinois. Investigations mentioned concern, among other subjects, the internal exposed leaf surface, nutrition, antibiotics and nematodes.

112. HAYTER, C. N.
Deciduous fruit growing: Rhodes Inyanga orchards.
Rhod. agric. J., 1954, **51**: 187-92, illus.

The Rhodes Inyanga Estate orchards, first established in 1890, were taken over by the Department of Agriculture in 1947 and are being run as a Horticultural Experiment Station. The research work in progress is briefly described. It includes scion and rootstock variety trials with apple, peach, plum, pear, apricot and nectarine, fertilizer and lime trials, control of delayed foliation in apple by DNOC sprays, control of pre-harvest drop in apple with hormone sprays, diseases especially apple mildew, apple pruning, green manuring, apple blossom and yield recording, pear tree debility, cider from cull apples, fruit marketing, a pear grafting experiment, and the successful introduction of Queensland nut, chestnut, pecan and *Aleurites*.

Breeding and varieties.

(*See also* 206b, e, w, 1138.)

113. NEUMANN, D.
Standortversuche mit Müncheberger Neuzüchtungen von Kern- und Steinobst. **(Trials with Müncheberg selections of pome and stone fruits at different places.)**
Dtsch. Gartenb., 1954, **1**: 300-3, bibl. 8.

The author discusses the scope of and methods used in these trials in which apple, plum, and sweet and sour cherry seedlings, bred and selected at Müncheberg, are being tested at 27 different places in Eastern Germany.

114. SCHMIDT, M.
Weitere Mitteilungen über einen früher beschriebenen Fall gehäufter Chimärenbildung beim Apfel. **(Further notes on a case of increased chimaera formation in apple.)**
Züchter, 1954, **24**: 305-6, bibl. 2.

In an earlier paper* the author described an apple seedling in which the skin colour of the fruits showed an uncommonly high degree of sectorial variation. In a further study 55·1% of the 214 fruits harvested in 1949 were found to have a distinct chimaeral character. Figures relating to the sizes of these well defined colour sectors are tabulated and the nature of the mutations causing them is briefly discussed.—Inst. Obstb. Obstzücht., Marquardt nr. Potsdam.

115. HASKELL, G.
The stamen constancy of diploid and polyploid pears.
New Phytol., 1954, **53**: 349-53, bibl. 8.

Stamen numbers were determined in 19 diploid, 5 probably diploid, 7 triploid, and 2 tetraploid varieties of cultivated pears. Flowers generally had 20 stamens, and style number was constant at 5, although there were variations. Stamen pattern was not related to polyploidy, and there was no relationship with clonal age, time of blossoming or phenotype. Stamen number is too stable in pears to be of diagnostic value, except for a few exceptional varieties.

116. WILLIAMS, R. R.
Perry pears and their characters: I.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 70-8, bibl. 1, illus.

Descriptions, with illustrations, are given of the fruit, tree, flower and leaf of 13 perry pear varieties. The commoner synonyms are also mentioned and notes provided on cropping and other characteristics.

117. WILLIAMS, R. R.
A survey of perry pears in the West Midlands: I. North-west Gloucestershire.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 64-9, bibl. 4.

A detailed survey has been undertaken of the numerous perry pear varieties in the chief perry growing areas of Gloucestershire, Herefordshire and Worcestershire. The present paper lists the varieties found in one of these areas with notes on synonyms and distribution.

118. FOGLE, H. W., AND OVERLEY, F. L.
Winter hardiness of stone fruit varieties in irrigated Central Washington.
Bull. Wash. agric. Exp. Stat. **553**, 1954, pp. 19, bibl. 10, illus.

Details of winter injury to stone fruits were noted after very low temperatures in January 1950, and the growth of trees in the subsequent growing season was studied. Almost all flower buds were destroyed on peaches, so that recovery in the following growing season was relatively rapid. J. H. Hale, Dixired, Golden Jubilee, Early Elberta and Sullivan Elberta were among the less hardy varieties. Apricot varieties of no commercial promise showed the least amount of winter damage. Riland and Perfection were promising parents for winter hardiness among seedlings tested. European-type plums did not suffer seriously except trees of low vigour, particularly those over 15 years old, and those having shown disease or Zn deficiency. Recovery of damaged trees was generally slow. Considerable damage was sustained by Japanese plum varieties, but recovery was fairly good in the following season. Santa Rosa, Duarte and Elephant Heart were among the more resistant varieties. Sweet cherries showed only minor damage, Lambert, Bing and Deacon showing more hardiness than other varieties tested.

---

* *Ibidem*, 1942, **14**: 112-17.

119. Schmidt, M.
Eine spätreife Sprossmutante der Kirschensorte "Königin Hortense". **(A late-ripening mutant of the cherry variety Reine Hortense.)**
Züchter, 1954, **24**: 215-16, bibl. 2, illus.

At the Institut für Obstbau und Obstzüchtung, Marquardt, near Potsdam, a mutant shoot was discovered on a Reine Hortense cherry tree with fruits ripening about 4 weeks after the normal time. Other pomological characteristics of variety and mutant are practically identical. The propagation of the mutant as a late cherry is considered.

120. Anon.
New variety of peach firm and bright under irrigation.
Agric. Res., 1954, **3** (3): 13.

Redglobe, a new peach variety developed by the U.S. Dep. Agric., will produce fruit with firm flesh and a high colour when grown under irrigation on the Pacific Coast. It is medium to large with a bright red blush over a yellow skin. The flesh is free from red streaks and of good flavour. It stands up well to storage and long-distance shipping.

121. Mowry, J. B.
Peach variety and seedling tests.
Trans. Ill. St. hort. Soc. for 1953, 1954, **87**: 80-8, bibl. 1.

Tables show the rating of peach varieties and seedlings for 9 major characteristics in 1953 at the Illinois Horticultural Experiment Station. The characteristics considered are: resistance to bacterial spot, productivity, date of maturity, fruit size, appearance, firmness, quality, flesh colour and adherence of flesh to stone.

122. Lee, F. A., Oberle, G., and Whitcombe, J.
Chemical composition and freezing adaptability of peach varieties grown in Western New York.
Bull. N.Y. St. agric. Exp. Stat. **768,** 1954, pp. 13, bibl. 16.

No relationship was found between the freezing adaptability of a peach variety and its ascorbic acid and carotene contents, soluble solids, free acids, and pH. The best yellow peaches for canning were McAllister, J. H. Hale, Midway, Morse No. 1, N.J.128, Ideal, Eclipse and Viceroy. The outstanding white varieties were Champion and Polly.

123. Schmidt, M.
Beiträge zur Züchtungsforschung bei Pflaumen. I. Über die Selbstungsnachkommenschaft einer Form von *Prunus insititia* L. **(Contributions to the genetics of plums. I. On the progeny of a selfed form of *Prunus insititia*.)**
Züchter, 1954, **24**: 157-61, bibl. 8, illus.

Some of the seedlings obtained are self-fertile, high-yielding, need little care and are frost-resistant, thus meriting consideration in further breeding work. The variety of forms appearing in these crosses confirms the author in his view that the pomological classification of *Prunus domestica* is untenable.—Inst. Obstb. Obstzucht. Marquardt, nr. Potsdam.

124. Crescimanno, F. G.
Contributo allo studio delle varietà di nespolo del Giappone coltivate in provincia di Palermo. **(Contribution to the study of the varieties of loquat cultivated in the province of Palermo.)** [English and French summaries 6 lines each.]
Riv. Ortoflorofruttic. ital., 1954, **38**: 247-67, bibl. 14, illus.

The present state and problems of the loquat-growing industry in the province of Palermo are discussed. An account is given of the morphology and physiology of the loquat and a description of 16 varieties, of which the 7 best are listed in their order of merit.

125. Spina, P.
Il gelso nero (*Morus nigra* L.) in Sicilia. Ricerche sperimentali sulla biologia fiorale. **(The black mulberry in Sicily. Floral biology studies.)** [English summary 4 lines.]
Riv. Ortoflorofruttic. ital., 1954, **38**: 328-37, bibl. 20, illus.

Studies showed that *Morus nigra dentata* subvariety "black-fruited Spanish mulberry" is self-fertile. Notes are given on its culture in Sicily.

126. Kamínek, M., and Kamínek, L.
Moruše trnavska a její praktický význam. **(*Morus trnaviensis* and its practical importance.)** [English and Russian summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Ser. A, 1954, **27**: 213-22, bibl. 8, illus.

It is thought that *Morus trnaviensis* originated as a cross between *M. nigra* and *M. rubra* or is, possibly, a triploid form of *M. nigra*. Notes are given on tree and fruit characteristics, and the suitability of the fruit for preservation is discussed.

127. Donath, E.
Die Edeleberesche und ihre Einführung in die Säuglingsernährung. **(The sweet service berry as a food for infants.)**
Arch. Gartenb., 1954, **2**: 207-12, bibl. 5.

Two varieties of the sweet service berry (*Sorbus aucuparia* var. *moravica*), described as the lemon of the north, have been entered in the official list of fruit varieties in Eastern Germany. A concentrate of the juice from one variety, with a vitamin C content of 240 mg.%, is available as infant food, while the berries of the other variety are used for making candied fruit. [See also *H.A.*, 19: 2732.]

Propagation and rootstocks.

128. Ževlakov, V. V.
Raising plant material without seedbeds. [Russian.]
Sad i Ogorod, 1954, No. 10, pp. 53-4, illus.

To dispense with the laborious operation of transplanting, stratified apple seed was sown in the spring in rows 70 cm. apart, and in the autumn the roots were cut back to a depth of 20–25 cm. with a horse-drawn plough used normally for digging up nursery trees. While the soil was loose the seedlings were thinned to 33 cm. apart. They later developed into very satisfactory rootstocks with well-branched roots.

129. Zdruĭkovskaja, A. I.
Raising seed embryos of cherry plum, obtained from secondary (autumn) flowering. [Russian.]
Agribiologija, 1954, No. 4, pp. 130-3, illus.

In experiments at the Nikitskiĭ botanic garden, cherry plums produced from a second flowering in autumn were compared with those produced from the normal spring flowering as a source of seed for excised embryo culture. A much higher proportion of plantlets was raised from the autumn crop seed, and after 3 years these produced fruit which matured earlier than that on the mother tree. The few plants raised from the normal crop seed developed slowly and had not flowered at the end of 3 years.

130. Krüssmann, G.
Bericht über einen Versuch zur Ermittlung der Haltbarkeit von frischen Pflanzenzweigen in Polyäthylenschläuchen. **(The durability of softwood cuttings in a polyethylene film.)**
Dtsch. Baumsch., 1954, **6**: 271-2, illus.

Cuttings were taken in June of pear, *Symphoricarpos, Syringa, Ribes alpinum* and *Lonicera pileata*. They were defoliated and packed as for export, but with an extra wrapping of polyethylene. After storage for 35 days the cuttings were still fresh and showed good callusing and some root formation.

131. de la Cruz, E., Jr., and Gonzalez, L. G.
The graft affinity of the fig, *Ficus carica*, with some of its congeners.
Philipp. Agric., 1953, **37**: 119-29, bibl. 4, illus.

Studies were made at the Philippine Central Experiment Station, Laguna, in 1951/53 on the propagation of *Ficus carica* by stem cuttings with a view to the production of scion material for inarching, and on its graft affinity with 12 other *Ficus* spp. In the propagation tests second flush cuttings gave the highest percentage rooting in frames and first flush cuttings in a hormone-treatment test. Of the methods of propagation tested, bottom heat (in a small-scale experiment) gave the highest percentage rooting, followed by frame propagation. Only *Ficus hauili, F. odorata* and *F. ampelos* were compatible with *F. carica.*

132. Tupicyn, D. I.
The effect of scion on the development of the root system of rootstock—cherry plum. [Russian.]
Agrobiologija, 1954, No. 3, pp. 124-7, illus.

Cherry plum, *Prunus sogdiana*, rootstocks were grafted with buds from the same species and from 5 other types of plum. Three types of scion resulted in predominantly fibrous root systems in the rootstocks and 3 types, including *Prunus sogdiana* itself, resulted in strong tap root production.

133. Barak, D.
Apple stocks. [Hebrew.]
Hassadeh, 1954, **34**: 887.

The behaviour of certain East Malling and local rootstocks in Israel is described.

Israel No. 1. Vigorous stock selected in Israel of Italian origin. Comes into leaf early and produces strong trees with a wide branch system. It develops rather slowly, and vigorous growth begins in the fourth and fifth years. Grows well in many types of soil but dislikes lime. Makes a strong union but comes into bearing rather late, five to six years after planting, so should not be pruned much in its first years. Produces large and well coloured fruits and is hardy and well adapted to conditions in Israel. Appears to be incompatible with Grand Alexander, but is a suitable stock for Delicious, Rome Beauty, Nonsuch, Reine de Reinette and Ben Davis.

East Malling XIII. Vigorous stock with spreading habit and good union with scion. Suitable for heavy and waterlogged soils, but will also grow on light sandy soils but then suffers from drought more than other more deeply-rooting stocks. Must have adequate irrigation during summer. Bears fruit early (in fourth year), is a heavy cropper and does not induce biennial bearing. Fruit is rather small and highly coloured. [Agrees with findings in G.B. In New Zealand is not found suitable for wet soils.]*

East Malling XVI. Vigorous stock, one of the latest to break bud (June). It also starts bearing late and is not very fertile. The fruit is small and lacks colour. It is outstandingly resistant to root diseases. [Agrees with experience in G.B. In Germany it is found susceptible to winter killing. In New Zealand its performance varies greatly.]*

Hashabbi (*Israel No. 10*). A local stock, moderately vigorous but with a poor root system and anchorage, especially on wet and heavy soils. Under these conditions the development is rather poor. More suitable for light soils but is apt to suffer from drought. It comes into bearing early and is a heavy cropper. The fruit is medium sized. Its principal disadvantage is that the roots are susceptible to attack by *Macrophoma, Sclerotinia* and *Rhizoctonia.* It also suckers badly.

Sukkari. (*Israel No. 3*). A local variety which grows well in the hilly districts. Similar to Hashabbi in compatibility but further experiments are needed.

East Malling II. A moderately dwarfing stock in Israel. Is short lived and succumbs after eight to ten crops. Produces a moderate root system with poor anchorage; needs ample irrigation; begins to bear in the fourth year. At first it crops heavily with large, wellshaped fruit, later the yield, quality and size of fruit deteriorate. Only suitable for interplanting or intensive short-term cultivation. [Does better in G.B. and N.Z. In N.Z. performance resembles that of Northern Spy. N. Spy preferred as being resistant to woolly aphis.]*

* Information afforded by R. J. Garner of East Malling and D. Mackenzie, D.S.I.R. N.Z., attached East Malling.

East Malling IX. The classical dwarfing stock with brittle roots. Starts bearing early and in great quantity. Fruits are of a good size and flavour. Suitable for intensive cultivation in sheltered positions in good soil with ample water and with heavy manuring. Under these conditions it is long-lived and is more resistant to diseases than M.II. It is not a suitable stock for Winter Banana.
A table is also included comprising these and other stocks showing their behaviour as regards soil, growth, water requirement, fertility and compatibility with 13 scion varieties of apple. H.C.R.

134. LUCKWILL, L. C., AND CAMPBELL, A. I.
The use of apomictic seedling rootstocks for apples. Progress report.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 47-52, bibl. 6, illus.

Seedlings of three apomictic species of *Malus* were raised and budded with the varieties Cox's Orange Pippin, Lord Lambourne and Worcester Pearmain. All three varieties proved incompatible with *M. hupehensis* but made good maiden growth when worked on *M. sikkimensis* and *M. toringoides* seedlings. Apart from 3 to 5% of dwarfs, which were rogued at an early stage, the growth of these apomictic seedlings and of the maiden trees worked on them was exceptionally uniform. A study of root structure suggests that *M. toringoides* will prove a vigorous stock and *M. sikkimensis* somewhat less vigorous. Similar indications were obtained from the amount of growth made by the trees in their first year. Both of these species had fibrous root systems and showed a satisfactory nursery performance. [Authors' summary.]

135. MCDANIEL, J. C.
The present status of apple and pear understocks.
Trans. Ill. St. hort. Soc. Soc. for 1953, 1954, **87**: 45-55.

The interest in the dwarfing M. VII and IX apple rootstocks and the 15 new M.M. clones is mentioned, and the shortcomings of Virginia crab and Hibernal are enumerated. A hybrid crabapple, "Robusta No. 5", and some *Malus* spp., especially *M. sikkimensis* which is apomictic and hence produces uniform seedlings, appear very promising. Some suitable rootstock-stem-builder-scion combinations are discussed. For pears *Pyrus* spp. and quince, alone or in combination with some stem-builders, are used, and plants of several related genera are now being tested.

136. WATANABE, T., AND INOUE, I.
Studies on pear rootstocks. I. Investigations on the root systems of one-year-old seedlings of several wild pears.
WATANABE, T., AND KAMATA, H.
Ibid. II. Effects of soil moisture on the growth of seedlings of several wild pears.
[Japanese, with English summaries ¼ and ⅓ pp.]
Bull. hort. Sect. [or *Branch*] *Kanagawa agric. Exp. Stat.*, 1953, No. 1, pp. 82-6, bibl. 8, illus., and 1954, No. 2, pp. 26-32, bibl. 11, illus.

Pyrus aromatica had the best developed root system and was followed in order of merit by *P. uyematsuana*, *P. calleryana*, *P. betulaefolia* and Nagano wild pear.
P. betulaefolia, varieties A and B of *P. calleryana*, *P. fauriei* and Nagano wild pear all wilted at 9·0–9·6% soil moisture and lost their leaves at 6·0–7·6%. *P. calleryana* (B) and Nagano showed the least resistance to drought and Nagano the least to waterlogging. Root and top growth were compared at low, normal and high soil moisture contents.

137. MAURER, K. J.
Zur Beurteilung der Stamm- bzw. Gerüstbildner. **(The evaluation of frame builders.)**
Züchter, 1954, **24**: 259-64, bibl. 12, illus.

Following preliminary tests in 1949 and 1950 [see *H.A.*, 21: 3257 and 22: 2190] records were taken in 1952 of the nursery behaviour of 9 apple frame builder varieties worked on Bittenfelder seedling, involving a total of 15,000 trees. Antonovka and Hibernal emerged as the most promising frame builders for the quarter standard tree which has now become the recognized tree shape in Germany in areas exposed to winter injury. Virginia Crab did not show symptoms of incompatibility with any of the varieties tested. The plea for studying the problem on a regional basis is renewed.—Geisenheim.

138. FILINGER, G. A.
Performance of selections of French Crab seedlings as body stocks.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 114-18, bibl. 1, illus.

A series of clones from 62 French crab seedlings, which survived a severe and sudden frost in 1940, have been under observation at the Kansas Agricultural Experiment Station. A report on their hardiness has already been published [see *H.A.*, 22: 137]. A very brief general report is made here on their strength, disease resistance, compatibility with Jonathan and Winesap, dwarfing character and drought resistance. Some of the stocks have been sent for trial to other States and to Canada. [See also *H.A.*, 24: 2245.]—Kansas agric. Exp. Stat.

139. MÜLLER, H., AND DAMASCHEK, J.
Beitrag zur Stammbildnerprüfung bei Birnen. **(The testing of stem builders for pears.)**
Dtsch. Gartenb., 1954, **1**: 333-4, bibl. 2, illus.

Tests at Dresden-Pillnitz confirmed observations made by nurserymen that the pear variety Sacharnaja (Russian sugar pear) and a certain wild pear from Galicia, both recommended as frost-resistant stem builders, are insufficiently frost-hardy for central Germany.

140. MURAWSKI, H.
Über vorläufige Versuchsergebnisse mit Müncheberger Pflaumenstammbildnern. **(Preliminary results of trials with plum stem builders at Müncheberg.)**
Arch. Gartenb., 1954, **2**: 222-35, bibl. 14, illus.

Illustrated descriptions are given of two seedlings from *Prunus domestica* and *P. cerasifera* crosses respectively, both of which showed promise as frost-resistant stem builders for plums. The *P. cerasifera* seedling, B IV, 19, 13, is of particular interest in that it is tetraploid; it is vigorous and can be propagated by cuttings.

Pollination

(*See also* 206q, t, u, x, 396.)

141. Coutaud, J.
Contribution à l'étude de la fécondation et de la fructification chez le pommier. **(A study of fertility and fruiting in the apple.)**
Ann. Amél. Plantes, 1954, **4**: 51-125, bibl. 46, illus.

Since 1947 studies have been made on fertility in 11 French apple varieties, and the following general conclusions are drawn: climatic factors, particularly temperature, affected the date and duration of flowering, although the varieties were not all equally susceptible; diploidy and triploidy could not be identified from flower morphology alone; a combination of factorial and cytological sterility was important in the decrease of triploid fertility; hormones play an important part in the fruiting processes, their presence having some influence on self- and cross-incompatibility, parthenocarpy and metaxeny. These conclusions emphasize the practical importance of planting mixed orchards.

142. Hartman, F. O., and Howlett, F. S.
Fruit setting of the Delicious apple.
Res. Bull. Ohio agric. Exp. Stat. **745**, 1954, pp. 64, bibl. 39, illus.

Flowers and young fruits of the apple variety Delicious were collected at anthesis and at 24-hour intervals after, from 4 orchards in Ohio, and their embryos and embryo sacs were examined cytologically. The development of the embryo sac was shown to be influenced to a greater extent by flower position in the cluster than by spur vigour. In all trees there was considerable immaturity and early degeneration of the embryo sacs both at, and after, anthesis, and it is suggested that this has a genetical basis. The occurrence of fertilization was observed to be greatly reduced in the ovules of flowers in which pollination was delayed for 48 hours after anthesis. Fertilization was seldom observed in embryo sacs less than 72 hours after pollination, which may account for the erratic fruit set of Delicious. The abscission of young fruits which were expected to fall during the "June drop" was not due to embryo abortion, but rather to an inadequate number of ovules having been fertilized and to competition with the fruits expected to remain on the tree.

143. Harley, C. P., Moon, H. H., and Regeimbal, L. O.
A modified method of obtaining fruit-set records for apples.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 146-8.

A modified technique for obtaining fruit set records on apple trees is described. The method is not based on the absolute counts of blossom clusters and fruits, but the data are the ratios of fruits to fruiting and non-setting spurs and shoots at the end of the drop period obtained on talley registers. No double counts are made. [Authors' summary.]—Plant Ind. Stat., Beltsville, Md.

144. Griggs, W. H., and Iwakiri, B. T.
Pollination and parthenocarpy in the production of Bartlett pears in California.
Hilgardia, 1954, **22**: 643-78, bibl. 34, illus.

The Bartlett pear, although practically self-sterile, is self-fruitful in most Californian orchards because of the production of parthenocarpic fruit. A study of Bartlett orchards during 1948-50 showed that trees planted in solid blocks, or with very few pollinators, produced an average of 85·3, 88·4 and 75·5% parthenocarpic fruit for the 3 respective years. Trees interplanted with pollinators produced averages of 29·6, 27·6 and 18·5% seedless fruit. Hand-pollination experiments showed that vegetative parthenocarpy was responsible for most of the seedless fruit produced. Stimulative parthenocarpy due to self-pollination did not give significantly greater fruit set than that effected by vegetative parthenocarpy alone. The more vigorous orchards gave the highest percentages of parthenocarpic fruit set, hence increased fruit set could probably be obtained by improving orchard management practices. Fruit sets were higher from hand-cross-pollination than from open pollination or from parthenocarpic fruit development. Fruit set could therefore be increased by interplanting orchards with pollinating varieties and by supplying bees to improve cross-pollination. Rat-tail pears from solid blocks of Bartlett contain significantly more seeds than normal ones. Hence the late-season blossoms produced at the tips of current season's growth, from which rat-tail pears develop, apparently have a higher degree of self-fertility than flowers opening at the normal time. Contrary to the belief of previous workers, parthenocarpic Bartlett pears were found on the average to have a more desirable and more uniform shape than those containing seeds. From this study it is concluded that, although in most years the parthenocarpic set is sufficient for a commercial crop in the better orchards, fruit set could be increased, especially under unfavourable conditions, by the presence of pollinating varieties and an adequate number of bees.

145. Solovjev, V. A.
The effect of volatile phytoncides on pollen germination. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **97**: 741-4, bibl. 6.

In the experiments described phytoncides emanating from leaves of some species stimulated pollen germination, while those from other species retarded it. Phytoncides from germinating pollen of *Typha latifolia* had a strong stimulating effect on the germination of alfalfa pollen, and it is assumed that this effect is characteristic of pollen of other plants also.

Growth.

(*See also* 31, 95.)

146. Martin, D., Lewis, T. L., and Cerny, J.
The physiology of growth in apple fruits. VII. Between-tree variation of cell physiology in relation to disorder incidence.
Aust. J. biol. Sci., 1954, **7**: 211-20, bibl. 8.

Mean cortical cell size, soluble and protein nitrogen per cell, preclimacteric respiration, mean fruit size, and incidence of disorders have been studied for fruit of each tree in a plot of 35 trees of Jonathan variety. These trees were remarkably uniform with regard to soil, aspect, tree size and pollinating variety, but provided a range of mean fruit size per tree. There was a high degree of correlation between the variables. Cortical cell size increased with mean fruit size but more rapidly than would be expected from a proportional increase with size of fruit. Protein nitrogen increased proportionally with cell volume but the ratio of protein nitrogen and cell surface increased with cell size, suggesting that the protoplasm increased in thickness with cell size. Intercorrelation between respiration per cell, protein nitrogen, soluble nitrogen, and cell size were particularly close, remaining highly significant even when mean fruit size per tree was held constant by methods of partial correlation analysis, suggesting that these characteristics are functions of cell growth and are not influenced by between-tree differences due to cropping. Disorder incidence is correlated with the other variables and the implications of these relationships are discussed. [Authors' summary.]—C.S.I.R.O., Hobart.

147. Martin, D.
Variation between apple fruits and its relation to keeping quality. III. Between-season variation in relation to seasonal climate.
Aust. J. agric. Res., 1954, **5**: 392-415, bibl. 30.

Studies were made of seasonal effects on ripening changes and disorder incidence in different varieties of apples in Tasmania for the 10-year period 1933-1943. Most of the changes associated with ripening, namely ground colour change, acid loss, starch conversion, soluble solids accumulation, softening, and respiration rise did not necessarily keep pace with each other and responded differently to seasonal variation, but there appeared to be a constant relation between firmness and acid level. In the final analysis, seasonal variation in the level of disorders was mainly related to differences in mean fruit size and when the size factor was held constant between seasons the differences remaining were relatively small. In the case of pit, some of these remaining differences could be accounted for by differences in relative maturity, but in the case of breakdown relative incidence between seasons was not related to relative maturity. There was an association of early blossoming with low incidence of pit and breakdown independent of later differences in seasonal climate. The results support the theory that low temperatures in the months prior to harvest increased susceptibility to breakdown. [Author's summary. For Parts I and II see *H.A.*, 24: 1218 and 2312.]—C.S.I.R.O., Hobart.

148. Sax, K.
The control of tree growth by phloem blocks.
J. Arnold Arbor., 1954, **35**: 251-9, bibl. 15, illus.

Studies on apple and poplar trees have shown that a phloem block can be induced without killing the tissues by exposing stem segments to X-rays sufficient to suppress cell division, or by inverting a ring of bark. The phloem block induced by irradiation appears to be due to the failure of phloem elements to regenerate. When a ring or two partial, overlapping rings of bark are inverted the reversed polarity of the tissue also prevents renewal of phloem elements, presumably by preventing the adequate movement of nutrients and auxins into the inverted phloem cells. The subsequent growth of trees supplied with inverted rings of bark is dwarfed but apparently healthy. Such trees have flowered and fruited normally.

149. Sax, K.
Here's easy way to dwarf trees.
Bett. Fruit, 1954, **49** (2): 9-10.

Dwarfing and earlier fruiting can be induced safely by inverting a ring of bark on the trunk of the tree. At the Arnold Arboretum, Mass., trials were conducted, mostly on apple trees, on the effect of single and double inverted rings of bark. It was found that, since normal polarity and growth were restored in the trees treated by both methods after 4–5 years, the single inversion is more practical. The treatment can be repeated when desired, or if the growth is not excessive it can be checked by simply cutting the bark completely around the trunk in mid-June. The most suitable time for bark inversion is from mid-June to late August. [See also previous abstract.]

150. Pilipenko, N. N.
Formation of fruit buds in apple trees. [Russian.]
Sad i Ogorod, 1954, No. 8, pp. 40-43, illus.

Some dates are given of apple fruit bud differentiation in the Ukraine, in different varieties, cultivated by different methods and on different types of wood. Factors, particularly soil moisture and nutritional, affecting the time of end differentiation are discussed, and it is shown that under the forest-steppe conditions of the U.S.S.R. it may occur in the summer, autumn, winter or spring.

151. Weinberger, J. H.
Effects of high temperatures during the breaking of the rest of Sullivan Elberta peach buds.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 157-62, 157-62, bibl. 2, illus.

Under orchard conditions brief periods of high temperatures during winter delayed blossoming and foliation and reduced fruit set of Sullivan Elberta peach. Continuous moderately higher temperatures delayed the breaking of rest of flower buds more than did brief periods of high temperature, but the latter had a greater delaying effect on leaf buds. Under the conditions of the experiment, high temperatures in December were more critical than those in November. January maximum temperatures were of little importance. [Author's conclusions.]—U.S. Dep. Agric., Fort Valley, Ga.

152. Futral, J. G., and Savage, E. F.
A device for measuring prunings.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 149-50, illus.

A description is given of a simple device, consisting of an electrically driven belt with a counter, for measuring the total length of prunings removed from a tree. It was designed as an aid to recording the linear growth of peach trees.—Ga agric. Exp. Stat.

153. CARLONE, R.
L'influenza di due diversi sistemi di piantagione sullo sviluppo e la produttività del pesco. **(The effects of 2 different planting methods on the growth and yield of peach trees.)** [English and French summaries 8 and 11 lines.]
Riv. Ortoflorofruttic. ital., 1954, **38**: 307-14, bibl. 11, illus.

In tests begun in 1945 in the Saluzzo district of Piedmont, J. H. Hale was either budded in the nursery in August on seedling rootstocks or budded in the field in November on the same stock. The field-budded trees had larger diameters and gave higher yields at first but were overtaken by the nursery-budded trees in both respects in 7–8 years.

154. BAKER, G. A.
Factor analysis of relative growth.
Growth, 1954, **18**: 137-43, bibl. 7.

Correlations have been obtained between size measurements of groups of fruits for peach and almond at various dates during the growing season. The method of factor analysis has been used in an attempt to isolate factors relating to fruit growth. Three such factors have been found, one a general growth factor, a second associated with early growth and a third with late growth. All three factors are present for peaches but only the first two for almonds.—Univ. Calif., Davis.
G.H.F.

Spraying for cultural purposes.

(*See also* 206 l.)

155. AUBERT, P.
Eclaircissage des fruits. **(Fruit thinning.)**
Rev. hort. suisse, 1954, **27**: 347-51, illus.

No effect of hand thinning fruit or flowers of 23-year-old Reinette de Champagne was shown in yields after 3 seasons. Golden Delicious needs severe thinning to avoid loss in tree vigour. Chemical thinning of Belle de Boskoop by NAA resulted in much reduced biennial bearing. Application of NAA at the rate of 7·5 g./100 litres did not cause scorching on Golden Delicious, and an average yield was obtained. An application of 16 g. NAA/100 litres on Starking caused rolling and yellowing of leaves.

156. BLOMMAERT, K. L. J.
Thinning apples at blossom time with hormone sprays.
Fmg S. Africa, 1954, **29**: 295-6.

A trial was started in Western Cape Province to evaluate the use of chemicals for thinning apples under South African conditions. The trees used were 20-year-old Golden Delicious and Ohenimuri, and the sprays used contained NAA or naphthaleneacetamide (NAM). NAA applied to Golden Delicious at 30 and 50 p.p.m., 1 and 2 weeks after full bloom respectively, gave 39% and 45% reduction in fruit set; NAM gave similar results. On Ohenimuri NAA, applied at full bloom or 1 week after, gave 70% reduction in fruit set; NAM had no significant thinning effect. It is emphasized that these results are as yet only indicative, and that further trials are necessary.

157. ABBOTT, D. L.
Growth substances as fruit-thinning agents for apples: Progress report.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 58-63, bibl. 5.

Branches of Early Victoria, Lane's Prince Albert and Laxton's Superb were sprayed with NAA at 2, 5, 10, 25, 50 and 100 p.p.m. 8 or 9 days after petal-fall. The relationship between spray concentration and thinning effect is shown to be approximately logarithmic. Although all three varieties were thinned by treatment, the size of the marketable crop was reduced and no recommendations for the general use of NAA as a post-blossom thinning agent can be made. An experiment in which branches of Laxton's Superb were hand-thinned prior to treatment with NAA suggests that an abundant supply of foodstuffs to the developing fruitlets minimizes the thinning effect of NAA. [Author's summary.]

158. PRESTON, A. P.
Effects of fruit thinning by the leaf count method on yield, size and biennial bearing of the apple Duchess Favourite.
J. hort. Sci., 1954, **29**: 269-77, bibl. 5.

A fruit-thinning trial was carried out on 14-year-old trees of Duchess Favourite on M.IX. Thinning treatments had no significant effect on either shoot growth or trunk growth increment. Early thinning reduced the intensity of the biennial habit in fruit bud formation. The loss of fruit after early thinning, by June drop, was very small. Trees thinned to 1 fruit to 10 leaves were little better than unthinned trees for regularity in fruit bud formation, fruit yield and fruit size, but the higher degrees of thinning made the trees more regular in fruit bud formation and overcame biennial bearing. The cropping of trees thinned to 1 fruit to 30 leaves fell without any improvement in regularity of bearing or fruit quality compared with trees thinned to 1 fruit to 20 leaves, which gave the most valuable fruit over the whole period. Data on red spider [*Metatetranychus ulmi*] damage showed that the greater the damage to the leaves the smaller were the fruits at harvest. A residual effect of degree of thinning on fruit yield was recorded for two seasons after cessation of the thinning treatments. [From author's summary.] —E. Malling Res. Stat.

159. FISHER, D. V.
Thinning tree fruits.
Agric. Inst. Rev., 1954, **9** (5): 11-14, 54, illus.

In British Columbia apricots, peaches and prunes were successfully thinned both chemically and mechanically. The effectiveness of the various chemicals tested and of the mechanical methods used, including hand, wire claw, brush and water spray, is discussed and the time required for each operation is compared. Apples were treated chemically only, with additional hand thinning where necessary. Chemical thinning of pears has not proved effective, and no tests were conducted on cherries.

160. Ronzoni, G.
Prove di diradamento in varietà di pesco di media maturazione e nella varietà "J. H. Hale". (**Fruit thinning tests on mid-season and J. H. Hale peaches.**) [English summary 7 lines.]
Riv. Fruttic., 1954, **16**: 112-23, bibl. 18, illus.

An account is given of experiments on the fruit-thinning of peaches by spraying with 20% DNOC at full bloom to kill the stigmas, followed by hand thinning after 7–9 weeks. In the self-fertile mid-season varieties, Gaillard 2 and Anna di Balducci, the treatments were successful, greatly reducing the number of fruits and greatly increasing their size. Fruit size, total weight of yield and girth expansion were the same with early and late hand thinning, but early hand thinning virtually eliminated the considerable drop which normally occurs at stone hardening at the end of May. In the self-sterile J. H. Hale chemical thinning was unsatisfactory, and the best time for hand thinning was after the June drop.

161. del Gaudio, S.
Ricerche sull'impiego del Fruitone sui fiori di mandorlo. (**Research on the use of Fruitone on almond flowers.**)
Riv. Ortoflorofruttic. ital., 1954, **38**: 273-8, illus.

Tests were made in 1950 to determine the effect of Fruitone, a naphthaleneacetic acid formulation, on fruit set and size. The material was sprayed once and twice at several concentrations on the flowers of the Cozzulecchia almond variety in bud and before and after petal-fall. It was found that (1) concentrations of 0·5 and 1·0‰ gave the best results; (2) a single application gave the larger number of fruits; (3) 2 applications gave the larger and heavier fruits; (4) the best time of application was just before the petals opened.—Staz. agrar. sper. Bari.

162. Crane, J. C.
Responses of the Royal apricot to 2,4-dichorophenoxyacetic acid application.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 189-93, bibl. 5, illus.

Aqueous spray applications of the ammonium salt of 2,4-D at concentrations of 50, 100, and 200 p.p.m. to the Royal apricot shortly after the initiation of pit hardening markedly increased rate of fruit growth. Diameter and fresh weight of fruit were increased a maximum of 14 and 50%, respectively, by spray application. Stimulation in growth of the flesh was responsible for the increase in fruit size. Maturity, as judged by % soluble solids content, was progressively hastened with each increase in concentration of 2,4-D applied. Embryo growth was stimulated by spray application as evidenced by the fact that the number which split their pellicles was related directly to 2,4-D concentration. Slight flagging of the foliage occurred, a condition that persisted to a minor extent until the fruit was harvested. The tips of the shoots that were growing at the time of spray application were killed and shoot growth thereafter was inhibited. [Author's summary.]—Univ. Calif., Davis.

163. Smock, R. M., Edgerton, L. J., and Hoffman, M. B.
Some effects of stop drop auxins and respiratory inhibitors on the maturity of apples.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 211-19, bibl. 2.

A summary is given of the results of 4 years' work at Cornell University, including some results published earlier [see *H.A.*, 22: 2206 and 23: 2646], on the acceleration of ripening caused by auxin sprays for pre-harvest drop control and on the value of certain respiratory inhibitors for counteracting this acceleration. It was found that the longer the interval between spraying and harvest, the greater was the ripening effect of an auxin. The ripening of early varieties was stimulated more than that of late varieties and the stimulatory effect of auxins varied from year to year. When used alone maleic hydrazide delayed maturity slightly. It partially controlled the ripening effect of auxins without interfering with drop control. Malonic acid, potassium malonate and iodoacetic acid also acted as respiratory inhibitors, but their use is not considered of commercial interest.

164. Moretti, A.
Prove comparative sull'efficacia dell'acido 2,4,5-triclorofenossiacetico e di altre sostanze di accrescimento sulla cascola preraccolta, di razze di pero e di melo. (**Comparison of 2,4,5-T and other growth substances on the control of pre-harvest drop in certain pear and apple varieties.**)
Atti I Conv. naz. fruttic., Montana, St. Vincent, *1953*, 1954, pp. 328-48, from abstr. in *Not. Mal. Piante*, 1954, No. 28, p. 89.

2,4,5-T at 50 p.p.m. gave control of pre-harvest drop in Red Delicious, 2.4-D at 20 p.p.m. in Vicar of Winkfield and alphanaphthaleneacetic acid at 10 p.p.m. in Beurré Giffard, Oliviero de Serres, Campanino Modenese and Morgenduft. In general, NAA was the most efficacious and quick-acting substance tested and had a residual effect lasting 2–3 weeks; 2,4,5-T and 2,4-D at 20 p.p.m. retarded both leaf fall and spring flush; and 2,4,5-T gave better colour but shortened storage life.

165. Abbott, D. L.
2: 4: 5-TP as a fruit-ripening agent: I. Apple var. Worcester Pearmain.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 53-7, bibl. 9.

Alpha-(2: 4: 5-trichlorophenoxy) propionic acid was applied at 30 and 50 p.p.m. to trees of Worcester Pearmain on 15 July and 4 August as a ripening spray. Ripe fruit of very good quality was harvested 12 days before the normal picking date, though the size and flavour were not fully developed. Storage quality of fruit was impaired following treatment with 2: 4: 5-TP, but not sufficiently to interfere with normal marketing. [Author's summary.]

166. Marle, G. S.
Bevordering van de kleur der vruchten door bespuiting met groeistofpreparaten. (**Improving fruit colour by spraying with growth substances.**)
Fruitteelt, 1954, **44**: 725.

In 1953 in 3 commercial orchards in the east of the Netherlands experiments were carried out on 5 apple varieties to study the effects of pre-harvest sprays on fruit colour. More marked effects were noticeable than in 1952 [see *H.A.*, 23: 3858]. When Jonathan and Belle de Boskoop were sprayed with Obsthormon 24 A, a reduction in fruit drop was clearly shown; the storage properties of Cox's Orange Pippin and Belle de Boskoop were not influenced by this spray. With Sterappel no influence on fruit colour was noticed using 2,4,5-T ester sprays, but in the 1954 season treated trees showed poor shoot growth and leaf development; no after-effects of this spray were observed on Glorie van Holland.

167. Southwick, F. W.
The influence of nitrogen level on the rate of ripening and color development of apples sprayed with growth regulating substances.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 225-33, bibl. 13, illus.

The effect of 2,4,5-trichlorophenoxypropionic acid (2,4,5-TP) and maleic hydrazide on the rate of ripening, colour development and keeping quality of apples from trees of varying nitrogen levels was studied. There appears to be an association between the N levels of apples and the degree of response obtained from the growth substances. 2,4,5-TP will hasten the rate of softening, red colour development and respiration of apples from high N trees sooner and to a greater degree than with fruit from trees at lower levels of N. With maleic hydrazide, greater respiratory inhibition occurs in fruits from trees at a moderate N level than in fruits from trees at a high N level.—Univ. Mass., Amherst.

168. Teskey, B. J. E., and Francis, F. J.
Color changes in skin and flesh of stored McIntosh apples sprayed with 2,4,5-trichlorophenoxypropionic acid.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 220-4, bibl. 8.

The changes in skin and flesh color of McIntosh apples sprayed with 2,4,5-TP during and after storage have been followed with a Hunter Color and Color-Difference Meter. The preharvest spray treatment produced apples that were redder and softer than the controls. The two groups showed no significant difference in rate of change of skin color after storage. The flesh color after storage was yellower in the sprayed fruit. Both sprayed and unsprayed fruits showed a change in flesh color from yellow towards the green and back to yellow after removal from storage. [Authors' summary.]—Ont. agric. Coll., Guelph.

Fertilizers and soil management.

(*See also* 206a, k, o, p, r, u, 1181f.)

169. Beattie, J. M.
The effect of differential nitrogen fertilization on some of the physical and chemical factors affecting the quality of Baldwin apples.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 1-9, bibl. 13.

1. Four levels of nitrogen fertilizer application were made to mature alternate bearing Baldwin apple trees for four consecutive years beginning in 1948. The effect of the different treatments were measured by determining total yield, fruit color, fruit weight, soluble solid and titratable acid content of the fruit. 2. Average total yield was found to vary directly with the rate of nitrogen application with two minor exceptions in 1949. 3. Trees heavily fertilized with nitrogen, the initial application having been made in the spring of the "off" bearing year (1948), have produced heavy annual crops for three consecutive years. 4. The percentage of well colored fruit decreased as the nitrogen supply increased. However, more bushels of well colored fruit were produced by trees receiving twice the normal application of nitrogen in light crop years and by trees receiving 1½ times the normal nitrogen application in heavy crop years. 5. One and one-half times normal nitrogen fertilization was associated with the production of the largest sized fruit in three out of four years while ½ times the normal rate of nitrogen fertilization was associated with the production of the smallest sized fruit in three out of four years. Fruit produced by trees from all treatments were, on the average, of acceptable size. 6. Differences in soluble solids-acids ratios between treatments were small. In heavy crop years trees receiving 1½ times the normal amount of nitrogen produced fruit with the highest soluble solids-acids ratios. Fruit with the highest soluble solids-acids ratios were produced in heavy crop years. 7. Heavy cropping tended to magnify treatment differences in soluble solids-acids ratios and total yield and to minimize treatment differences in fruit color and fruit weight. 8. The 2N treated trees produced a four year total yield estimated at nearly twice the value of the four year total yield of 1N treated trees. [Author's summary.]—Ohio agric. Exp. Stat., Wooster.

170. Baxter, P.
Urea for fruit trees.
J. Dep. Agric. Vict., 1954, **52**: 398, 424.

A brief introduction is given to the use of foliage sprays of urea on apples as an alternative nitrogen fertilizer. Preliminary trials have been conducted in southern Victoria on varieties Granny Smith, Jonathan and Five Crown, using 1–5 sprays of 0·5–1% urea. There was no increase in nitrogen content of leaves, setting of fruit, fruit yield or size or weight of annual growth following urea foliage applications. A mixture of 1% urea and the mercury fungicide PMF caused a marginal leaf scorch on apple leaves. [Author's summary.]

171. Norton, R. A., and Childers, N. F.
Experiments with urea sprays on the peach.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 23-31, bibl. 14.

Experiments were made at New Brunswick, N.J., in 1950 and 1951 on Elberta, Red Rose and Golden Jubilee peaches, Stayman apples and Mission almonds grown in sand culture in crocks covered with Vinylite caps to prevent contamination by spray, dust or rain water. In 1950 the only consistent differences between results from different treatments were less leaf drop late in the season and slightly darker green foliage after urea spraying. In 1951 all sprays were given when the shoots were in active growth, hydrated lime was added to the spray and a more suitable spreader was used. A significant response in growth and foliage was obtained from the sprays. Sulphur-bentonite at 6/100 to urea 10/100 acted as a good sticker. The addition of starch, molasses or sulphur-bentonite did not increase the effect of equal amounts of urea applied alone. Molasses, however, at 10/100 enabled more urea to be applied without foliage injury. The addition of ammonium carbonate, ammonium citrate or sodium bisulphite to the urea made no apparent difference, nor did spraying with 2/100 and 5/100 sodium nitrate or ammonium sulphate or 2/100 zinc nitrate have any effect. Almonds proved more sensitive than peach and were almost defoliated by 10/100 sprays, which was the maximum tolerated without foliar burning by peach. Eight urea sprays at 5/100 on Stayman apples gave growth and foliage colour comparable to those on trees given complete nutrient solution through the roots. Urea sprays 5/100 had no effect in 2 peach orchards in 1950. It would appear from this that the peach can absorb nitrogen applied as urea to the foliage but not so efficiently as apple.

172. Eckert, J. W., and Childers, N. F.
Effect of urea sprays on leaf nitrogen and growth of Elberta peach.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 19-22, bibl. 10.

Under New Jersey conditions in 1952 urea spray, with or without dormant oil or sulphur-bentonite mix, applied at concentrations of 10 to 100 lb. per 100 gallons to dormant peach trees grown outdoors in sand culture had no effect on growth or leaf nitrogen content. The sand cultures were covered with plastic sheeting to prevent spray drip into the cultures. Four early foliar urea sprays applied to 1-year-old peach trees growing in minus nitrogen sand culture increased leaf nitrogen significantly by 1 July. By the end of the summer this effect was reversed in favour of the non-sprayed control trees. Urea foliar sprays at 15 and 20 lb. per 100 gallons caused increased terminal growth, but lower concentrate sprays had no effect.

173. Ticknor, R. L.
The entry of nutrients through the bark and leaves of deciduous fruit trees as indicated by radioactive isotopes.
Diss. Abstr., 1954, **14**: 434-5, being *Publ.* 7169 of 131 pp.

Entry of mineral nutrient solutions applied to bark and leaves was more rapid while the trees were in active growth, than while they were dormant or after maturation. Radio-phosphorus applied to the bark of 3-year-old apple limbs was still entering after 192 hours; on leaves diffusion was still occurring 24 hours after application. Nutrients were sprayed onto 1-year-old Montmorency sour cherry trees and 2-year-old McIntosh apple trees at the dormant bud and green tip stages. Little phytotoxicity was shown by solutions at concentrations of 8% or less. Terminal buds were destroyed by 16 or 32% calcium chloride solutions, and lateral buds by 16 or 32% phosphoric acid. Many dormant apple buds were killed when sprayed with 16 and 32% NuGreen or a 20-20-20 fertilizer containing urea, but few buds were susceptible at the green tip stage. On cherry both NuGreen and the fertilizer caused marginal chlorosis or variegation at both stages of bud development. Differences in the uptake of radiophosphorus appeared to be due to variations in maturity. Diffusion of radiophosphorus was greater through injured than through intact bark.

174. Ritter, C. M.
The use of soluble tissue tests in determining the mineral element status of apple trees.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 37-40, bibl. 12.

A study was made to determine the degree of correlation between the total quantities of N, P, K, Ca and Mg in apple foliage and the amounts of these elements found in extracts of the leaves made according to the method of Wolf and Ichisaka [see *H.A.*, 18: 481]. Highly significant positive correlations were found between total P and K and the extract fractions in blades, petioles and entire leaves on every occasion of sampling. Highly significant positive correlations were also found between total Ca and Mg and the extract fractions in blades and entire leaves but not in petioles. The correlation coefficients for the 2 Mg quantities, however, were not so great as those for P, K and Ca. It is concluded that, except in the case of N, the analysis of leaf extracts might provide a relatively cheap, rapid and accurate diagnostic method for use alone or in conjunction with soil tests in the determination of nutrient levels in apple trees and in making fertilizer recommendations.—Ohio St. Univ., Columbus.

175. Rogers, B. L., and Batjer, L. P.
Seasonal trends of six nutrient elements in the flesh of Winesap and Delicious apple fruits.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 67-73, bibl. 6.

The seasonal movement of elements into apple fruits in relation to rate of fruit growth was studied. Standard growth curves were constructed to make it possible to select fruits throughout the growing season which were destined to attain a size of 2¾ in. diameter at maturity. Concentrations of the various elements were similar at all sampling dates for both Winesap and Delicious. P, K and Bo accumulated in the fruits at a more or less constant rate throughout the season. N also increased throughout the growth period but at a much faster rate early in the season. The fruit had accumulated half of its total N 54 days after bloom, though the fruit was then only one-fifth of its final size. Accumulation of Ca and Mg progressed steadily up to about 90 days after full bloom when it temporarily levelled off, to increase again towards the end of the season. Percentages of Ca, P, Mg and N underwent a very rapid decline during the early part of the season, later they declined more slowly, and tended to level off during the latter part of the season. The concentrations of K and Bo also declined early in the season but more slowly than the other elements. During the latter half of the season the level remained relatively stable. K ceased declining in concentration earlier than the other elements and was present at a relatively constant level, as well as in greater concentration, longer than any other element.—U.S. Dep. Agric., Wenatchee, Wash.

176. Comin, D., and Sullivan, D. T.
The degree of dissociation of acids in the Rome Beauty apple and its relation to maturation, season, and differential nitrogen levels.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 205-10, bibl. 2.

Further studies on the "index number" (quantity of dissociated hydrogen per unit displaceable hydrogen) are reported. [For earlier work, see *H.A.*, 24: 2306.] There is evidence that the magnitude of the index number is related to the physiological condition of the fruit, as is shown by the highly significant mean difference between the index numbers of apples harvested in the most mature stage at any picking date and those of fruit harvested at the same time but in the least mature stage. The index number may also be closely correlated with the nitrogen status of the tree. Trees high in N produced apples much higher in active hydrogen per unit of replaceable hydrogen, regardless of harvest date. This indicates that apples produced on trees with a favourable nutritional balance will be higher in active hydrogen and will tend to keep better in storage. The index number is a sensitive measure of the physiological condition of both fruit and tree. There was a highly significant difference between the index number values from year to year.—Ohio agric. Exp. Stat., Wooster.

177. WEEKS, W. D., AND OTHERS.
Red apples require balanced nutrition.
Bett. Crops, 1954, **38** (7): 6-8, 36, illus.

In a commercial McIntosh orchard in Massachusetts, 10 different annual fertility treatments of 10 trees each produced a range of 28 to 79% of fancy fruit. The best coloured fruit was obtained from trees each of which had received 140 lb. of hay mulch, and showed low leaf nitrogen and high potassium content. Complete fertilizer treatment produced intermediate, and high nitrogen poor fruit colour. High nitrogen resulted in high total yields of rather soft fruit. For good fruit quality increased potassium nutrition, either by hay mulch or by K fertilizers, is recommended, but at the same time a high magnesium liming programme should be adopted to prevent potassium-induced Mg deficiency.

178. PROEBSTING, E. L., AND WARNER, R. M.
The effect of fertilizers on yield, quality and leaf composition of figs.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 10-18, bibl. 2.

Nitrogen fertilization gave increased growth and yield of Calimyrna, Adriatic and Black Mission figs. Although there has been a belief among growers that the use of N would result in splitting and souring, this was not found to be true in any of the tests made. Even very large rates applied to Black Mission failed to produce this defect. There was little evidence of absorption of P or K by the trees where heavy single applications were made. The depressing effect of N on P content of leaves often found with other fruits was evident in the Adriatic but not in the Calimyrna variety in these trials.—Univ. Calif., and Calif. Fig Res. Inst., Fresno.

179. FIŠČENKO, G. I., AND NIDENKO, I. F.
A machine for deep fertilizer application in orchards. [Russian.]
Sad i Ogorod, 1954, No. 8, pp. 43-5, illus.

A tractor-drawn implement distributing solid or liquid fertilizer in a 20 mm. wide band to a depth of 50 cm. is described and illustrated. In apple and pear orchards NPK applied to a depth of 50 cm. produced better growth and higher yields than when applied by the same machine to a depth of only 30 cm. or by other methods. Root injuries caused by the implement were clean cuts which healed rapidly.

180. ITO, H., AND OTHERS.
Ecological investigation of peach trees on volcanic black soil. II. Effects of soil properties on top and root growth of peach trees in orchards with black soils of various profiles. III. Relation of soil chemical composition to shoot growth, fruit bud formation and fruit development. [Japanese, with English summaries ½ and ⅓ pp.]
Bull. hort. Sect. [or *Branch*] *Kanagawa agric. Exp. Stat.*, 1953, No. 1, pp. 68-78, bibl. 5, illus., and 1954, No. 2, 16-25, bibl. 16.

Peach trees growing on a deep, moist, light, sandy loam overlying impermeable clay showed very vigorous top and root growth and gave low yields. Leaf analysis showed high nitrogen. The application of phosphorus had little effect. Root pruning reduced vigour in young trees. The soil was rich in nitrogen, poor in available phosphorus, normal in replaceable potassium in the upper horizons and rich at lower levels in some cases. The vigorous extension growth, which continued 10–15 days longer than normal, impeded fruit bud formation and fruit development. Shoot analysis showed high nitrogen and low total sugars and polysaccharides. It was concluded that the extensive root systems favoured by the soil properties provided ample water and nitrogen for vigorous extension growth, and that this resulted in inadequate carbohydrate utilization and accumulation for fruit bud differentiation and fruit development.

181. WAY, R. D.
The effect of some cultural practices and of size of crop on the subsequent winter hardiness of apple trees.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 163-6, bibl. 5.

Five orchard treatments were made in the fall of 1951 on 17-year-old Cortland apple trees. Twig samples were taken during the winter of 1951-52 to determine treatment effect on winter hardiness. The twigs were frozen artificially and the extent of freezing injury was determined by measuring the electrical conductivity of water extracts of the thawed twigs. By the same method a comparison was made in 1952 between the hardiness of twigs growing on 25-year-old Yellow Newtown trees that had borne heavy and light crops. Twigs from Cortland trees which were irrigated in the fall of 1951 suffered significantly greater freezing injury than twigs from non-irrigated trees. Twigs from similar trees treated either with 3 or with 7 lb. of ammonium nitrate suffered significantly greater injury than those from non-fertilized trees. Artificial drought and fall pruning had no measurable effect on the hardiness of Cortland twigs. Twigs from Yellow Newtown trees that had borne light crops were significantly more hardy than twigs from trees that had borne heavy crops. The time of harvest had no measurable effect on the subsequent hardiness of twigs. [Author's summary.]

182. Bould, C., Thomas, W. D. E., and Tolhurst, J. A. H.
Cover crops in relation to soil fertility and fruit tree nutrition: the effect of grass on the uptake of total and fertilizer phosphate by Malling I rootstocks.
J. hort. Sci., 1954, **29**: 301-9, bibl. 12.

Pot experiments with P^{32} were used in studies of the effect of perennial rye grass *versus* clean cultivation on the fertilizer-P and total P uptake by M.I apple rootstocks. Grass, when supplied with adequate nutrients and cut frequently, the cuttings being left to decompose *in situ*, increased the fertilizer-P uptake by 37%, total P content being unaffected. Without adequate nitrogen grass reduced dry matter, fertilizer-P uptake and total P content. Grass had no effect on the percentage of total P in leaf dry matter.

183. Folley, R. R. W.
Grassing down is cheaper in the long run.
Grower, 1954, **42**: 723-5.

The costs of an acre of grassed orchard are compared with those of an arable orchard. The average yearly cost of an acre of grass when cut by a gang mower is £5 18s. 6d. per acre, and £4 14s. 6d. when a rotary mower is used. The yearly costs of an acre of arable orchard are £4 8s. 3d. A comparison of benefits of the 2 systems, however, favours grassing down, as the additional cost of organic manures for arable orchards would be at least £8 per acre.

184. Shannon, L. M., and Christ, E. G.
Some experiences with replanting peaches in New Jersey.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 151-6, bibl. 8.
Replanting peaches.
Amer. Fruit Gr, 1954, **74** (10): 5, 14-15, illus.

Growth and yield data of replanted peach trees in the Burlington, New Jersey, experiment indicate that the replant problem is not serious on this site. No significant differences in tree growth or yield resulted from sawdust mulch, straw mulch, manure, or minor element treatments. Trees growing in sites fumigated with DD have been significantly larger than non-fumigated controls each year subsequent to planting. The increased tree size is believed to result from an initial stimulus during the first and perhaps second years. Trees in the Minotola, New Jersey, experiment receiving soil fumigation and corncob mulch treatments produced significantly more growth than other treatments. A chemical analysis of the foliage indicated that neither deficient nor toxic levels of nutrients were responsible for the failure of the remaining trees to make satisfactory growth. Parasitic nematodes were discovered on peach roots in this orchard. This suggests that the growth response resulting from soil fumigation may be due to the elimination of these organisms. Little information has been gained concerning the growth resulting from corncob mulch treatments. [Authors' summary.]—N.J. agric. Exp. Stat., N. Brunswick. The article in the *American Fruitgrower* is a shorter account of the same experiment.

185. Dufour, A.
Chariot transplanteur construit avec les moyens du bord. **(A home-made mobile tree transplanter.)**
Rev. hort. suisse, 1954, **27**: 291-2, illus.

A mobile wooden frame, with a winch attached to a fixed oblique arm, has been used to transplant 10- to 20-year-old fruit trees in Lucerne. With this apparatus the tree, with a ball of earth round the roots, can be removed and carried to its new position.

186. Simons, R. K.
Effects of moisture deficiencies upon fruit production in Illinois.
Trans. Ill. St. hort. Soc. for 1953, 1954, **87**: 108-17, bibl. 6.

Two consecutive dry seasons resulted in reduced growth and yields. Methods suggested for overcoming serious moisture deficiencies in apple and peach orchards include: semi-trashy cultivation by the use of a culticutter, careful application of readily available fertilizers, modification of pruning, mulching and, where possible, irrigation.

187. Degman, E. S., and Grim, J. H.
Sprinkler irrigation on adobe soils.
Bett. Fruit, 1954, **49** (4): 9-10, 18-21.

Sprinkler irrigation was compared with furrow irrigation for Anjou pear trees growing in heavy adobe soil in the Rogue River Valley during the 4-year period 1948-1951. Despite the tendency of this soil to swell when wetted, water penetration was as satisfactory from the sprinkler application as from furrows. For equal tree response somewhat more water was required on the sprinkler plots. [From authors' summary.]

Pruning.

(*See also* 206c, 1140.)

188. Baldini, E.
Ricerche sulla terapia delle ferite di potatura negli alberi da frutto. **(Research on the treatment of pruning wounds in fruit trees.)** [English, French and German summaries.]
Riv. Ortoflorofruttic. ital., 1954, **38**: 215-43, bibl. 44, illus.

After a general introduction and a consideration of the processes of healing in major pruning wounds, recent work on wound treatment is reviewed. The author then gives an account of his experiments over a period of 5 years on the treatment of major pruning wounds in peach and pear, partly by the "sector" method in which a wound is divided into 2 equal sectors by the insertion of a glass strip and the 2 sectors receive different treatments. His conclusions are that (1) iron sulphate at the concentration normally used is injurious to the tissues and its antiseptic action is short-lived; (2) sodium silicate (waterglass) does not afford sufficiently prolonged protection, as it soon comes off; (3) red lead dressing (boiled linseed oil, turpentine and lead oxide) and bitumen-asbestos-creosote mixture do not materially accelerate healing but give a prolonged and effective cover; (4) a Swiss product, Proxyl, gives satisfactory protection, stimulates healing and, like the 2 materials mentioned in (3), is easy to apply.

Composition of fruits.

(*See also* 206m.)

189. Dickinson, D., and Gawler, J. H.
The chemical constituents of Victoria plums: preliminary qualitative analysis.
J. Sci. Food Agric., 1954, **5**: 525-9, bibl. 11.

Using predominantly the techniques of paper chromatography, supplemented by spot tests, it has been shown that the colouring matter in ripe Victoria plums is cyanidin-3-monoglucoside and that this appears to be the only anthocyanin present. There appear to be varying amounts of chlorophyll or its degradation products in plums from different areas, but this requires further investigation. Chlorogenic acid occurs in Victoria plums, as also do malic and phosphoric acids. Quinic acid was not found in all samples. Citric, tartaric and other fruit acids are absent and no trace of caffeic acid could be detected. The sugars in Victoria plums are fructose, glucose and sucrose. Rhamnose and galactose could not be detected and sucrose was not always detected in bottled fruit. [Authors' summary and conclusions.]—Fruit Veg. can. quick freez. Res Ass., Chipping Campden.

190. Ash, A. S. F., and Reynolds, T. M.
Ketose oligosaccharides in the apricot fruit.
Nature, 1954, **174**: 602-3, bibl. 6.

A number of oligosaccharides which are hydrolysed by invertase to glucose and fructose have been found in ripe apricots. In one case a hexitol was also detected in the hydrolysis products. The occurrence of these fructose-containing oligosaccharides in the apricot suggests the presence of a transfructosidation system. Sucrose is the most likely source of fructosyl radicals. There are indications that some of these oligosaccharides occur in other fruits, such as pears and peaches.—C.S.I.R.O., Homebush, N.S.W.

191. U.S. Department of Agriculture, Bureau of Agricultural and Industrial Chemistry (Hilbert, G. E.).
New browning compound isolated from fruits.
Rep. Administ. agric. Res. U.S. Dep. Agric. for year ending June 30th, 1953, 1954, pp. 60-1.

Investigations are reported from the Western Region Research Laboratory on the enzymatic browning of the cut surface of deciduous fruits. An examination of the tannins, browning substances, of several fruits has confirmed the presence of chlorogenic acid and led to isolation and identification of the hitherto undiscovered compound, neochlorogenic acid. These two substances are similar in chemical composition but differ in their structural configuration. The existence of these related tannins was shown in peaches, apricots and prunes, and present results strongly suggest that they are responsible for the major part of enzymatic browning. The application of this knowledge to control of the browning reaction and to breeding for low browning susceptibility is suggested.

192. Pridham, J. B.
Some observations on the composition, function and biogenesis of plant gums with particular reference to the plum gums.
Biochem. J., 1954, **57** (4): xxviii, bibl. 4.

Gum exuded from bark and fruit of plum trees consists largely of a complex acidic polysaccharide. The proportions of D-mannose and L-arabinose are higher in bark gum than in fruit gum. Small-scale experiments have indicated that gum formation is probably enhanced when micro-organisms are artificially introduced into plum trees.

Storage.

(*See also* 101, 146, 147, 206d, j, 207, 690.)

193. Nijland, H. J.
Bewaarproef met Present van Engeland in luchtgekoelde fruitbewaarplaatsen. **(Storage experiments with Present van Engeland in an air-cooled fruit store.)**
Fruitteelt, 1954, **44**: 915.

The apple Present van Engeland stored better when it had been stacked outside, under shelter, after picking. In 2 successive seasons the optimum stacking period was 25 and 45 days respectively.

194. Dullum, N., and Rasmussen, P. M.
Forsøg med opbevaring af paerer 1939-1952. **(Pear storage trials 1939-52.)** [English summary 1¾ pp.]
Tidsskr. Planteavl, 1954, **58**: 91-148.

Data are tabulated on the behaviour of 11 pear varieties, including Beurré Hardy, Bonne Louise, Conference, Doyenné du Comice and Bartlett, in common ventilated storage, cold storage (+3° and +1° C.) and gas storage (6% and 9% CO_2). Whereas ventilated storage proved unsatisfactory, cold storage at +1° C. extended the storage life of 5 varieties to 4–5 months and of one variety (Conference) to 6 months, storage at +3° C. giving inferior results. Two varieties only (including Conference) were found to be suitable for gas storage, while for 3 others (including Doyenné du Comice and Bartlett) the treatment is considered to be of possible interest.—Blangstedgaard.

195. Stoll, K.
Die Lagerung von Äpfeln in konditionierter Luft (Gaslagerung). **(The gas storage of apples.)**
Schweiz. Z. Obst- u. Weinb., 1954, **63**: 418-21, illus.

It appears from 2 years' preliminary trials at Wädenswil that under Swiss conditions the gas storage of a few selected apple varieties should be a profitable proposition.

196. Solon, R. W.
Waxing apples.
Amer. Fruit Gr, 1954, **74** (9): 15.

McIntosh windfalls, washed and coated with a wax-in-water emulsion, were successfully stored for 8 months.

197. Leblond, C.
L'Hydrocooling. **(Hydrocooling.)**
Arboric. fruit., 1954, Nos. 6-7, pp. 23-5, illus.

Tests in France on hydrocooling of apples, pears, peaches and apricots showed that refrigeration of peaches and apricots by this method was 25 times quicker than by the forced ventilation method. The refrigeration speed for apples and pears was slower than for stone fruits. Apricots and peaches, on arrival at the end of a long train journey, showed no difference in quality between those hydrocooled and those refrigerated by forced ventilation.

198. Padfield, C. A. S.
Omega plums, can they be exported?
Orchard. N.Z., 1954, **27** (7): 17-19.

Omega plums were picked at 3 stages of maturity during their normal picking period, and stored for 7 weeks at temperatures between 31° and 38° F. Under all treatments considerable fruit shrinkage was observed, particularly with the later picks. Fruit flesh was crisper at lower temperatures. All stored fruit had tough skins. The results showed that Omega plums could be stored long enough for transport to the North American and English markets when kept at 30–32° F. throughout the transit period. Fruit harvested during the second and third weeks of February should arrive in a satisfactory condition.

199. Ildis, P., and Patron, A.
Préconservation des abricots à basse température en vue de leur utilisation en conserverie. (**Cold storage of apricots before processing.**)
Fruits d'Outre Mer, 1954, **9**: 349-53, bibl. 6, illus.

Tests, mainly with the Canino variety, showed that temperatures of 0° to +2° C. delay browning of the flesh near the stone longer than does +6° C., but ripening is retarded to such an extent that after several weeks' storage it does not continue normally. Fresh slices can be canned and jams made satisfactorily from apricots stored for a month at +2° C., but canning of deep-frozen fruit was not successful.

Packing and processing.

200. Banta, E. S.
How to bag apples.
Amer. Fruit Gr, 1954, **74** (8): 6-7, 21, illus.

Some methods of packing apples in polyethylene bags used by growers in New York State are described. Most bagging is done by hand, but auto-bagging units, often attached to the graders, are also used. At a co-operative cold store bagging continues throughout the winter as the fruit comes out of store. Although the cost of bagging is higher than that of a conventional pack, members received about 25 cents more per bushel for bagged fruit.

201. Carlsen, E. W., and others.
Methods and costs of loading apples in the orchard in the Pacific Northwest.
Market. Res. Rep. U.S. Dep. Agric. **55**, 1954, pp. 25, bibl. 4, illus.

Improvements in the technique of apple-box handling are reviewed. Reduction of labour costs has been made possible by methods which reduce the number of times that the boxes are handled.

202. Crang, A., and Sturdy, M.
A comparison of some varieties of fruit preserved by bottling and by freezing. Progress Report IV.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 199-205, bibl. 2.

Colour, texture and flavour ratings are tabulated and discussed for 24 varieties of plum, 8 of which were gages, preserved by bottling and freezing, and for 10 varieties of raspberry judged as fresh fruit as well as after bottling and freezing. The frozen raspberries were superior in colour and texture to the bottled fruit, but the reverse was true with all but three of the plums. With the method of thawing used, none of the frozen gages proved satisfactory.

203. Burroughs, L. F., and May, Y. P.
The composition of the juices of some varieties of cider apples.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 178-83, bibl. 4.

The average juice composition of 14 cider apple varieties recommended for general planting is presented with respect to specific gravity, acid and tannin contents, and rate of fermentation. Studies on variation in juice composition in Kingston Black revealed a tendency for specific gravity to be directly related with the amount of summer sunshine. A statistical examination of 308 samples of Kingston Black juice showed that more than 50 samples of fruit are needed in order to estimate the average specific gravity with a precision of ±5 degrees. Other juice constituents show similar variability.

204. Nyfeler, A.
Kann die Zeit für das Trocknen von Zwetschgen verkürzt werden? (**Shortening the time required for the drying of zwetschen fruits.**)
Schweiz. Z. Obst- u. Weinb., 1954, **63**: 404-7.

Preliminary trials with several varieties of zwetschen showed that a pre-treatment at 90° C. for 2 hours considerably reduces the time required for drying the fruits.—Wädenswil.

205. Service de l'Horticulture, Maroc.
Note sur le séchage des figues en milieu Marocain. (**Note on fig drying under Moroccan conditions.**)
[*Mimeo.*] *Serv. Hort.* [*Rabat*], [undated], pp. 7, illus.

Moroccan fig varieties recommended for drying are given; only well caprified figs should be used. The fruits are dipped into a salt and sodium bisulphite solution before being laid out in the sun to dry. The final stage of drying takes place in the shade. [See also *H.A.*, 23: 3890.]

Noted.

206.

a Bean, G.
Some aspects of orchard irrigation.
Comm. Gr, 1954, No. 3060, pp. 347-8, and No. 3061, pp. 412-13, illus.
Various methods discussed.

b Bishop, C. J.
X-ray induced bud sports in apples.
Fruit Var. hort. Dig., 1954, **9**: 25-8, bibl. 6, illus.
For another account see *H.A.*, 24: 3453.

c Black, J. D. F., and Greatorex, F. J.
Pruning of apple trees.
J. Dep. Agric. Vict., 1954, **52**: 289-303, illus.

d Bottini, E.
Le basi scientifiche della conservazione frigorifera dei prodotti ortofrutticoli, con particolare riguardo alle mele. (**The Scientific basis of the cold storage of horticultural products with special reference to apples.**) [English summary ½ p.]
Ann. Sper. agrar., 1954, Vol. **8**, No. 5, Suppl., pp. xxxix-liii, bibl. 17.
General remarks.

e Bulatović, S.
Prilog poznavanju rodnosti važnijih sorti bresaka u Smederevskom Podunavlju. (**A contribution to the study of the productivity of the more important peach varieties of the Danubian region of Smederevo.**) [French summary 2 pp.]
Arh. poljopr. Nauk, 1954, **6** (12): 120-31, bibl. 7, illus.
An evaluation of blossom characteristics and fruit drop in 11 varieties.

f Bünemann, G.
Der Obstbau auf der Insel Fünen. (**Fruit growing on the Danish island of Fünen.**)
Verlag Kommentator G.m.b.H., Frankfurt/Main, 1954, 9½×6½ in., pp. 60, bibl. 33, illus., being *Publ. land- u. hauswirtsch. Auswertungs- u. InformDienst* **82**.

g Cuénot, G., and Garangeat, S.
La plantation des arbres fruitiers. (**Planting fruit trees [in Morocco].**)
Publ. Serv. Hort. Rabat **4**, 1951, pp. 23, illus.
With notes on spacing for citrus and deciduous fruit trees.

h Darrow, G. M.
The capulin cherry of Ecuador.
Fruit Var. hort. Dig., 1954, **9**: 23-4, illus.
Prunus serotina ssp. *capuli*.

i Davis, M. B., Blair, D. S., and Spangelo, L. P. S.
Apple breeding at the Central Experimental Farm, Ottawa, Canada, 1920-1951.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 243-50, bibl. 15.
Analysis of results from the 31-year apple breeding programme.

j Fabris, A.
Processi biochimici e tecnologici nella conservazione della frutta e relativi succhi. (**Biochemical and technological processes in the storage of fruit and fruit juices.**)
Ann. Fac. Agrar. Portici, 1951-53 (issued 1954), **20**: 35-57.

k Horth, C. J.
Orchard drainage.
Agric. Gaz. N.S.W., 1954, **65**: 187-96, 264-8, 316-21, bibl. 3, illus.
Under N.S.W. and other Australian conditions.

l Kelley, V. H.
Up-to-date in chemical peach thinning.
Trans. Ill. St. hort. Soc. for 1953, 1954, **87**: 95-101.
Tests with different substances on different varieties of peach.

m Lawrence, J. M., and Groves, K.
Determination of a soluble pectin in apples.
J. agric. Food Chem., 1954, **2**: 882-5, bibl. 19.
By photometry.

n Lott, R. V.
An analysis of the problem of satisfactory maturity standards for Illinois apples.
Trans. Ill. St. hort. Soc. for 1953, 1954, **87**: 101-8.
Present standards and their possible improvement.

o Morita, S.
Studies on soils of apple orchards in Japan. IV. On soils of apple orchards in Aomori prefecture. Replaceable cation and cation exchange capacity. V. On soils of apple orchards in Aomori prefecture. Boron and arsenic content. [English.]
J. hort. Ass. Japan, 1954, **23**: 48-51, bibl. 2, 51-2, bibl. 4.
For further information on the physical and chemical properties of these soils see *H.A.*, 23: 190.

p Northcote, G. S.
Management of orchard soils.
N.Z. J. Agric., 1954, **89**: 77-83, bibl. 7, illus.
A discussion of practices necessary for the maintenance of a permanent sward.

q Ōgaki, C., and Sudo, N.
Pollination studies on several Japanese pear varieties. [Japanese, with English summary 12 lines.]
Bull. hort. Sect. Kanagawa agric. Exp. Stat., 1953, No. 1, pp. 79-81, bibl. 5.

r Proebsting, E. L., Jr., and Kenworthy, A. L.
Growth and leaf analysis of Montmorency cherry trees as influenced by solar radiation and intensity of nutrition.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 41-8, bibl. 13.
See *H.A.*, 23: 3838.

s Spoor, P. A.
De aanlegkosten van een boomgaard. (**Planting costs of an orchard.**)
Fruitteelt, 1954, **44**: 895, 897.
Using different stocks including M.IX, VII, IV, II and I at different spacings.

t Telford, H. S.
Longer pollen life sought by scientist.
Bett. Fruit, 1954, **49** (4): 5, 8.
By better methods of preserving pollen.

u Titus, J. S.
Trends in orchard soil fertility research.
Trans. Ill. St. hort. Soc. for 1953, 1954, **87**: 55-9, bibl. 6.

v TREVISAN, M.
Studio comparativo sul valore alimentare delle cultivar di gelso "florio" e "nervosa" nell'allevamento del *Bombyx mori.* (**Comparison of the food value of the Florio and Nervosa varieties of mulberry in rearing *Bombyx mori.***) [English summary 12 lines.]
Ann. Sper. agrar., 1954, **8**: 1401-14, bibl. 7, illus.
The Florio variety had the better food value.

w VOGEL, —.
Pêchers pour climats chauds. (**Peaches for hot climates.**)
Terre maroc., 1954, **28**: 360-2.
The performance of 10 American peach and 2 nectarine varieties in Morocco.

x VOGEL, R.
Notes sur la caprification. (**Notes on caprification.**)
Terre maroc., 1954, **28**: 248-50.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(*See also* 15, 77, 103b, 110, 273a, e, f, h, j, l, m, o, q, 1168.)

207. THE GROWER.
Annual Fruit Review, Autumn, 1954, 1954, pp. 52, illus.

This review is largely concerned with the more important developments in top and soft fruitgrowing during the decade since the war, and their effect on the industry. It includes the following articles: High concentration spraying, by E. R. Hoare; Developments in the storage of fresh fruit, by R. G. Tomkins; The propagation of healthy fruit trees, by A. F. Posnette; Some problems of bush and cane fruit, by L. Knight; Years of change in growing strawberries, by R. Peake; Management of modern orchards, by J. Turnbull; Recent studies in mineral deficiencies, by N. H. Pizer; The search for better fungicides, by M. H. Moore.

208. KRUFT, F.
Neuzeitlicher Anbau der Brombeere und der Himbeere im Erwerbsbetrieb und im Garten. (**Modern blackberry and raspberry culture in private and commercial gardens.**)
Grundlagen u. Fortschritte im Garten- u. Weinbau, Eugen Ulmer, Stuttgart (at present Ludwigsburg), 3rd edition, 1954, Heft 59, 8×6 in., pp. 167, illus., DM. 5.60.

I, pp. 7-121. Blackberries. The author, a progressive gardener, has made good with blackberries since the last war, and the great practical detail with which he treats all operations from his own experience constitutes the chief value of this enthusiastic book. Among very many other things we learn how to guard against autumn frosts by encouraging early maturity of the wood, and how to prevent losses from crown gall, the most serious threat to neglected plantations. Most of the varieties recommended are familiar in Great Britain, though not always under the same name, the Himalaya Berry, for instance, being an introduction into England of the vigorous Theodor Reimers which is widely grown in Germany.
II, pp. 122-67. Raspberries. [For review of 1st edition see *H.A.*, 16: 704.] The text has now been thoroughly revised and brought up to date. It may be noted that the German grower is still [apparently] untroubled by the virus problem which is mentioned neither in connexion with the selection of planting material nor in the chapter on diseases. Spur blight continues to be the dreaded scourge, though its control has become simpler by the discovery of the association between *Didymella applanata* and the cane midge *Thomasiniana theobaldi*. New varieties recommended for experimental planting include Malling Promise and Rote Wädenswiler. As regards the desirability of expanding raspberry culture in Germany, the author has nothing to retract from his earlier views. This practical two in one manual deserves success.

209. SLATE, G. L.
New blackberry varieties.
Bull. N.Y. St. agric. Exp. Stat. **764,** 1954, pp. 4, illus.

Two new blackberry varieties, Bailey and Hedrick, are described. It is hoped that their introduction will halt the decline in commercial blackberry growing in New York State.

210. EINSET, J., AND PRATT, C.
Hybrids between blackberries and red raspberries.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 257-61, bibl. 7, illus.

Hybrids between blackberries and red raspberries can be produced in numbers. Certain combinations were productive of vigorous seedlings, notably diploid red raspberry × tetraploid blackberry, and tetraploid red raspberry × tetraploid blackberry. Blackberries used as seed parents have as yet given no vigorous seedlings. Allo-tetraploids (or amphidiploids) were fruitful; triploid hybrids were highly sterile. Tetraploid hybrids produced abundant fruits intermediate between raspberries and blackberries. Further breeding work with these hybrids seems possible. [Authors' summary.]—N. York agric. Exp. Stat.

211. KERR, E. A.
Seed development in blackberries.
Canad. J. Bot., 1954, **32**: 654-72, bibl. 23, illus.

This study of blackberries [and native raspberries representing several *Rubus* spp.] deals with seed production and germination, describes the main steps in megagametophyte development of pseudogamous and syngamous varieties, and traces the development of both germinable and aborted seeds. Certain conclusions are drawn concerning the interdependence of maternal and filial tissues. The number of drupelets which develop in both pseudogamous and syngamous varieties depends, in part, on the pollen parent. A small but rather constant proportion of the drupelets display only a partial enlargement. Seeds of the well-developed drupelets are divided into three intergrading classes: (i) plump seeds, (ii) collapsed seeds, and (iii) an intermediate group. The general developmental features of the ovule and its contents are described. Regular megagametophyte formation is the rule in the syngamous varieties, but many irregularities, especially multiple gametophytes, are common in the pseudogamous species studied. Approximately a third of the seeds in the drupelets which appeared normal at 6 to 15 days after pollination did not contain an embryo. Some of the "eggs" were disintegrating, whereas others were still in a turgid condition. All the seeds which were imperfectly developed contained endosperm but only rarely was there an embryo or its remains. Reserve food was usually stored only in the chalazal region of the endosperm. The endosperm is believed to stimulate the transfer of nutrient materials to the seed. The embryo supplements this function as the seed approaches maturity, and influences the distribution of the storage products within the endosperm. [Author's abstract.]—Wisc. agric. Exp. Stat., Madison.

212. Zielinski, Q. B., Garren, R., Jr., and Annen, C. J.
Effects of para-chlorophenoxacetic acid and beta-naphthoxyacetic acid on increasing fruit size in thornless evergreen blackberries.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 182-8, bibl. 9, illus.

In 1951 Evergreen blackberries were sprayed 14 days after full bloom with para-chlorophenoxyacetic acid (4-CPA) and beta-naphthoxyacetic acid (NOA), alone and in combination at various concentrations. Several of the treatments resulted in increased fruit size, the greatest increase of 20% being given by 100 p.p.m. 4-CPA+100 p.p.m. NOA. In 1952 similar treatments were given 14 days after full bloom, followed by 2 further half-strength treatments at 10-day intervals. Increases of 24% were given by 4-CPA+NOA at 50 and 100 p.p.m. (first spray). The increase in fruit size resulting from these sprays was due chiefly to the increased number of developing drupelets per berry, to the enlargement of the fleshy pericarp of the drupelets and to the larger receptacle of each berry. When applied in combination, the growth substances caused no harmful effects. When NOA was applied alone at 250 p.p.m., however, a significant decrease in fruit size occurred. Further work is needed before the use of the chemicals can be recommended for commercial practice.—Ore. agric. Exp. Stat., Corvallis.

213. Wishart, J. W.
Ascorbic acid (vitamin C) content of varieties of blackcurrants.
Tasm. J. Agric., 1954, **25**: 164-7, bibl. 4.

Amongst commercial black currant varieties grown in Tasmania, White Bud has the highest and Goliath the lowest ascorbic acid content.

214. Webber, E. R.
The cultivation of blueberries.
World Crops, 1954, **6**: 409-12, bibl. 9, illus.

Blueberries, *Vaccinium* spp., are native to North America where they became domesticated some 50-60 years ago and are now a popular garden fruit. In the United States 7 types or species are grown extensively and 3 others are found on a smaller scale. Notes are given on soil requirements, propagation, planting, cultivation, pruning, harvesting, varieties, pests and diseases and attempts to grow the crop in Great Britain.

215. Webber, E. R.
Blueberries can prove a grower's proposition.
Comm. Gr, 1954, No. 3096, pp. 796-7, illus.

An outline of North American methods of growing highbush blueberries is provided as a guide to prospective growers in Britain. In trials on Exmoor, in S.W. England, Rubel proved the best variety, followed by Jersey, Burlington and Pemberton.

216. van der Geijn, S. A. H. M.
Biedt Nederland mogelijkheden voor de teelt van blauwe bessen? **(The possibility of blueberry growing in the Netherlands.)**
Fruitteelt, 1954, **44**: 843-5, illus.

After visiting the blueberry farm of a pioneer grower and breeder in Germany, the author concludes that its culture should be possible on certain acid soils in the Netherlands. In Germany the plants grown were Goldtraube and Zuckertraube, hybrids between *Vaccinium corymbosum* and *V. pennsylvanicum*, and these have now been planted in a trial field in Limburg.

217. Darrow, G. M., and Scott, D. H.
Longevity of blueberry seed in cool storage.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 271.

Very good germination (86·2%) was obtained of 12-year-old rabbiteye blueberry seed, and good germination (59·0–63·5%) of 9-year-old seed of highbush varieties that had been stored in a refrigerator at about 40° F.—U.S. Dep. Agric., Beltsville, Md.

218. Rake, B. A.
The propagation of gooseberries: I. Some factors influencing the rooting of hardwood cuttings.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 79-88, bibl. 3.

The effect of different methods of preparing and treating gooseberry cuttings on percentage rooting and vigour was investigated. The varieties Leveller and Keepsake were used in 1951, and Leveller, Keepsake and Careless in 1952. Of the three varieties tested cuttings of Leveller proved the most difficult from which to produce a satisfactory bush. The performance of this variety was much improved when leaves were retained on the cutting. In 1951 cuttings planted in late September gave better results than those planted in August, October or November. The practice of "heeling in" cuttings for one to two months before planting was found not to be detrimental. The presence of buds on the portion of the cutting below ground improved the rooting of August-planted cuttings, but impaired that of cuttings planted in December. For cuttings taken in early August the retention of the shoot apex (removed in [the following] spring) had a beneficial effect. The shoot apex had no effect when cuttings were taken and planted in December. The percentage rooting of cuttings on plots with a high water table in winter was not significantly different from that on better drained soil though the subsequent growth of the cuttings was poorer. There was no relation between the number of roots produced on a cutting and the amount of callus developed on the basal cut. [Author's summary.]

219. SERGEEVA, K. D.
Fruit and seed formation in hybrid seedlings of gooseberry in relation to their pollinators. [Russian.]
Agrobiologija, 1954, No. 2, pp. 144-6, bibl. 1, illus.

Self pollination and open pollination of a new mildew-resistant gooseberry resulted in small fruits with few seeds, but when plants flowering for the first time were pollinated with pollen of large-fruited varieties, or with certain pollen mixtures, fruit quality was greatly improved.

220. SLATE, G. L.
New raspberry varieties.
Bull. N.Y. St. agric. Exp. Stat. **763,** 1954, pp. 4, illus.

Descriptions are given of two new red raspberries, September and Milton, and one amber-coloured variety named Amber. September is a so-called ever-bearing raspberry producing an autumn as well as a summer crop, both being of commercial quality. Milton has been introduced primarily because of its resistance to mosaic. Amber is suitable only for private gardens.

221. LEE, F. A., AND SLATE, G. L.
Chemical composition and freezing adaptability of raspberries.
Bull. N.Y. St. agric. Exp. Stat. **761,** 1954, pp. 12, bibl. 12.

Composition studies on raspberry varieties showed that, in general, good freezing varieties were higher in ascorbic acid, soluble solids and free acids, and lower in pH than less suitable freezing varieties. Of the varieties tested under New York conditions, Willamette, Milton, Taylor and Newburgh were the best red varieties, Sodus and Marion the best purple, Bristol the best black, and Amber the best yellow variety. Red raspberries were a reasonably good source of ascorbic acid, black and purple were only fair.

222. SLATE, G. L.
New strawberry varieties.
Bull. N.Y. St. agric. Exp. Stat. **762,** 1954, pp. 7, illus.

Detailed descriptions are given of 5 new strawberry varieties, Empire, Eden, Erie, Essex and Dresden. Eden is a processing variety and Essex is considered best adapted to private gardens. The others are recommended for commercial trial for the fresh fruit market. Empire appears to be relatively frost-resistant.

223. MILLER, J. C.
Strawberry growing in Louisiana.
Market Grs' J., 1954, **48** (11): 16, 27, illus.

Three strawberry varieties are described, namely Klonmore, Marion Bell and Konvoy, suitable for growing under Louisiana conditions.

224. REID, D. D.
The problems of Climax and its successor.
Grower, 1954, **42**: 881-3, 947-8, 995-7.

The author discusses the problems of disease resistance in strawberries and the reasoms why growers have relied so much on the variety Climax. He suggests that it may yet be possible to "live with" June yellows; meanwhile it is hoped to release a new variety [Talisman] with the same ripening period as Climax, in 1955.

225. ANON.
Talisman to succeed Climax.
Grower, 1954, **42**: 809.

The Scottish Horticultural Research Institute hopes to release a limited quantity of a new strawberry variety, named Talisman, raised at Auchincruive. Its season is about the same as Climax and it has cropped equally heavily; it stands up to transport and is resistant to a number of races of red core diseases.

226. HOLFELDER, E.
Überprüfung von Erdbeersorten auf ihre Konservierungseigenschaften (1949-1953). **(Tests of strawberry varieties for their processing qualities, 1949-1953.)**
Züchter, 1954, **24**: 257-8, illus.

In tests of many old and new strawberry varieties Senga 29 was the only strawberry, the preserved product of which received full marks.—Weihenstephan.

227. KÖHLER, D.
Zur Qualitätsauslese bei Erdbeeren. **(On the selection of strawberries for quality.)**
Züchter, 1954, **24**: 307-11, bibl. 2.

One of the difficulties encountered in the selection of strawberry clones for fruit quality after freezing has been that flavour is affected by such factors as age of plant, date of picking, period of ripening, etc. In an attempt to base selection on a chemical analysis of the fruit it was found that sugar content is inversely related to yield. Hence it appears that the metabolic performance of strawberries cannot be further improved by breeding. Juice retention on thawing and colour estimation in the processed product were other lines of study pursued.—Max-Planck-Inst., Züchtungsforsch. Hamburg.

228. JORDAN, C.
Die Abhängigkeit der Erdbeererträge von Düngung und Umweltbedingungen als Grundlage für die Züchtung hochertragreicher Erdbeersorten. **(A study of the effects of fertilizers and environmental factors on strawberry yield as a basis for breeding high yielding strawberry varieties.)**
Züchter, 1954, **24**: 295-300, bibl. 5.

The evaluation of results of 5 years' strawberry variety trials was complicated by great variation in yield of the same variety in different years. From this it is concluded that only relative yield figures in relation to other varieties can usefully be stated for strawberries. Mineral fertilizers failed to induce a response, but the effect of organic manures and irrigation remains to be determined. The application of these and some other findings to breeding for high yield is discussed.—Max-Planck-Inst. Züchtungsforsch., Hamburg.

229. ČUEV, V. V.
Promising strawberry seedlings for the Murmansk region. [Russian.]
Agrobiologija, 1954, No. 3, pp. 131-4, illus.

On the Kola Peninsula cultivated varieties of strawberry propagated by runners from central Russia are killed by frost. Plants raised locally from seed of different origin were found to be more hardy, and out of about 1,000 seedlings 4 showed very good promise and are here described. The method of raising strawberry seedlings in the open under arctic conditions is outlined.

230. Kluge, K.
Untersuchungen zur Züchtung polyploider Monatserdbeeren. Zur Morphologie tetraploider Formen der Sorte Rügen. (**On the breeding of polyploid everbearing strawberry varieties. The morphology of tetraploid forms of the variety Rugen.**)
Arch. Gartenb., 1954, **2**: 201-6, bibl. 19, illus.

Tetraploid plants of the *Fragaria vesca* variety Rügen, produced by colchicine treatment, are described and illustrated.—Inst. Obstb. Obstzücht. Marquardt nr Potsdam.

231. Haskell, G., and Williams, H.
Biometrical variation in flowers of a polyploid series of strawberries.
J. Genet., 1954, **52**: 620-30, bibl. 16.

Studies were made of sepal, petal and stamen numbers in a polyploid series of strawberry (*Fragaria*) species and varieties, and in the related species *Duchesnea indica.* Sepal and petal numbers hardly varied with ploidy group, whereas stamen numbers of octoploids and decaploids were considerably higher than in lower ploidy groups and in *Duchesnea* (a dodecaploid). The mean stamen numbers fall in multiples of five, with minor variations. In octoploid Royal Sovereign the number of floral parts decreases from primary to later flowers, but the ratio of numbers of different parts remains more or less constant. Comparisons are made with stamen studies in other plants. Several evolutionary problems are discussed: it is suggested that the strain of *Fragaria chiloensis* at present cultivated in Ecuador is not identical with the ancestral strain of the cultivated strawberry. [From authors' summary.]—John Innes hort. Instn.

232. Slits, H. J. A.
De teelt van vollegronds aardbeien. (**The growing of outdoor strawberries.**) [English summary ¼ p.]
Meded. Dir. Tuinb., 1954, **17**: 648-57, bibl. 6, illus.

The production of outdoor strawberries in the Netherlands has almost reached its pre-war level. Two-thirds of the crop is processed, the principal varieties being Jucunda, Climax and Deutsch Evern. The crop is generally left down for 3 to 5 years, although a 1-year culture of Deutsch Evern is possible. Strawing is not general, but has resulted in better quality fruit where practised. A catch crop of turnips is recommended as offering some frost protection and keeping the land clean.

233. Kronenberg, H. G.
Autumn crop by short day treatment.
Grower, 1954, **42**: 729-30, illus.

The commercial use, in Holland, of short day treatment to obtain an autumn crop of strawberries is described. The variety used, Deutsch Evern, is grown in frames for a first early spring crop in May. Short day treatment is then given by covering the frames with thick rush mats from 6 p.m. to 6 or 7 a.m., and continues for 5-6 weeks from the end of May. Fruiting in late September and October depends largely on the autumn weather, but a yield of 2 lb. per light is considered satisfactory. [See also *H.A.*, 20: 107 and 24: 2395i.]

234. Yokomizo, T., and Kobayashi, M.
Studies on strawberry forcing. I. Flower bud development of young plants grown in a cool, high situation.
Yokomizo, T., Kobayashi, M., and Mizorogi, K.
Idem. II. Effect of transplanting date on flower bud differentiation. [Japanese, with English summaries 10 and 13 lines.]
Bull. hort. Sect. [or *Branch*] *Kanagawa agric. Exp. Stat.*, 1953, No. 1, pp. 21-8, bibl. 12, and 1954, No. 2, pp. 58-65, bibl. 10, illus.

Fukuba strawberry plants grown at 750 m. altitude differentiated their flower buds about 2 weeks earlier than those grown at a lower-lying station with temperatures 3–5° C. higher. The date of differentiation was not affected by the time that runners were planted over the period mid-June to early August. Flower bud differentiation was advanced 2 weeks by covering for a month. The development of the first flower buds was best when plants were transferred from the high to the low elevation immediately after flower bud differentiation.

Runners transplanted in the first half of September showed earlier flower bud formation than runners that were not transplanted, and produced better root systems and larger early yields than runners transplanted earlier.

235. Denisen, E. L., Shaw, R. H., and Vance, B. F.
Effect of summer mulches on yields of everbearing strawberries, soil temperature and soil moisture.
Iowa St. Coll. J. Sci., 1953, **28**: 167-75, bibl. 2, illus.

Spring-planted Superfection everbearing strawberries were used in an experiment to determine the effect of spacing, runner removal and summer mulches on late summer yields. Mulching treatments were applied to plots planted according to the 3-row system of spacing with continuous runner removal, and consisted of sawdust, chopped corncobs, straw and no mulch. A matted row treatment with no mulch and no runner removal was also included. The 3-row treatments with runner removal all produced significantly higher yields than the matted row. Within the mulching treatments the sawdust plots gave significantly higher yields than the rest. The straw and corncob plots did not differ significantly in yield from the unmulched 3-row plots. The yields of the mulch treatments were in inverse relationship to the rate of decomposition of the mulching materials, suggesting the possibility that yields were affected by the degree of nutrient tie-up in the soil. The soil moisture percentage was significantly higher under the mulches than in the unmulched 3-row plots, but the various mulches did not differ significantly in their effect on soil moisture. Soil temperatures, measured at 4 p.m. at 1 and 3 inch depths, were 8–10° F. higher in the unmulched than in the mulched plots.

Within the mulched plots the differences were relatively small. Parent plants of the matted row plots had considerably smaller root systems than those of the 3-row plots. Among the 3-row plots the unmulched plants had slightly deeper root systems with more new growth at greater depths. The advantages of summer mulches on everbearing strawberries are discussed. [See also *H.A.*, 24: 2338.]

236. Anon.
New rotary cultivator.
Amer. Fruit Gr, 1954, **74** (9): 14, illus.

A 4-foot-wide, rotary cultivator for strawberries is described, which will incorporate straw mulch into the soil in one quick operation. The machine straddles the plant row, deflector plates protecting the plants from the soil thrown up by tilling.

237. Bennett, H. P.
Report on decomposition in strawberries (pigment changes).
J. Ass. off. agric. Chem. Wash., 1954, **37**: 566-7, bibl. 3.

The anthocyanin, pelargonidin-3-galactoside, is responsible for 90% of the colour in strawberries. Losses of this pigment during short-term decomposition proved too slight to provide a means of measuring fruit decomposition.

Vines.

(*See also* 273b, c, d, g, i, k, n, p, 511.)

238. Morton, W. F.
Grape-growing in British Columbia.
Hort. Circ. B.C. Dep. Agric. **78**, 1954, pp. 24, illus.

There are approximately 500 acres under vines in British Columbia, 426 of which are in the Okanagan Valley. An account is given of the cultivation of the crop under the following main headings: site and soil, varieties, propagation and planting, trellising, pruning, fertilizers, weed control and harvesting. Vineyards in the Okanagan Valley are at present free from pests and diseases, though powdery mildew, chlorosis, cutworms, grape leaf-hoppers and black vine-weevil have sometimes caused concern. European varieties highly desirable for their wine qualities comprise 10% of the Okanagan vine acreage. They include Excellent, Riesling, Sylvaner and Pearl of Csaba.

239. Thomson, N. J.
Irrigated vineyards in Australia.
Quart. Rev. agric. Econ., 1954, **7**: 117-22.

Land allocations for vine fruits under the War Service Land Settlement since 1945 amount to 20,000 acres, of which 63% are for drying grapes and the remainder for wine. When plantings are completed, however, more than one-third of the drying grape and three-quarters of the wine grape allocation will remain unused. Nevertheless the scheme has seen an expansion in dried vine fruit acreage of 9% and of wine grape acreage of 2%. The highest acreages planted to grapes for drying by 1953 were in New South Wales, Victoria and South Australia, and South Australia was the only State where wine grape plantings had been extensive.

240. di Crecchio, R.
La produzione e l'esportazione del Pergolone nel Chietino. **(Production and export of Pergolone grapes in the province of Chieti.)**
Riv. Ortoflorofruttic. ital., 1954, **38**: 338-44, illus.

The table grape variety Pergolone is the principal vine variety grown in the province of Chieti. Information is given on its morphology, growth characters, the chief pests and diseases to which it is susceptible, rootstocks, production and export.

241. Dalmasso, G.
Per un' ampelografia dei principali vitigni ad uve da vino coltivate in Italia. **(An inventory of the chief Italian wine vine varieties.)** [English summary 8 lines.]
Ann. Sper. agrar., 1954, Vol. **8,** No. 5, Suppl., pp. lxiii-lxx, bibl. 1.

Information is given on an inventory of Italian wine vine varieties commissioned by the Minister of Agriculture and Forests on the suggestion of the Italian Academy of Vines and Wine. A series of monographs on the principal varieties is to be published.

242. Cosmo, I., and Polsinelli, M.
"Tocai Friulano." **(Tokay of Friuli.)** [English summary 12 lines.]
Ann. Sper. agrar., 1954, Vol. **8,** No. 5, Suppl., pp. lxxi-lxxxiii, bibl. 23, illus.

Synonymy of the white wine variety Tocai Friulano much cultivated in the provinces of Gorizia, Udine and Venezia, origin and history, description, phenology, cultural characters, uses, economic importance and geographical distribution. This monograph is published under the auspices of the Commission for the preparation of an inventory of the principal Italian wine vine varieties. [See above, 241.]

243. Harrington, F. B.
Grapes that smile in summer rains.
Fmrs' Wkly, S. Afr., 14 July, 1954, pp. 14-17, illus.

In Natal and other eastern areas of South Africa with humid, wet summers, the European vine, *Vitis vinifera*, can only be grown trellised, under some form of cover. There are now, however, many American varieties suitable for a humid climate, but as a safeguard against virus introduction their import is prohibited. Before the embargo came into force the author obtained a few of these and he here briefly describes them. The methods and material used in the development of tropically adapted varieties are discussed.

244. Dermen, H.
Colchiploidy in grapes.
J. Hered., 1954, **45**: 159-72, bibl. 12, illus.

Over a 2-year period polyploidy was successfully induced by colchicine treatment in 10 varieties and selections of bunch grapes adapted to the north-eastern United States, in one *V. vinifera* grape of California and in 16 muscadine grapes adapted to the southern United States. The technique and the identification of tetraploidy is described in detail. Chromosome doubling has insured fertility in some sterile hybrids in other species. Crosses will be attempted between tetraploids of bunch and muscadine grapes in the hope that fertile hybrids may result from these crosses. [Author's summary.]—Agric. Res. Serv., Beltsville, Md.

245. EINSET, J., AND PRATT, C.
"Giant" sports of grapes.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 251-6, bibl. 6, illus.

Ten periclinal chimeral sports of Catawba, Concord, Fredonia and Hicks with a single outer diploid layer of cells and tetraploid inner tissue are described. Four forms of the varieties Caregnane, Muscat of Alexandria, Niagara and Thompson Seedless, reported to be tetraploid, were also found to be periclinal chimeras of the same type. Breeding work with the first group of grapes indicated that chimeral forms behaved like tetraploids. [Authors' summary.]—N. York agric. Exp. Stat., Geneva.

246. PIROVANO, A.
Sulla resistenza alla fillossera della *Vitis vinifera.* (**On phylloxera resistance in *Vitis vinifera.***)
Riv. Vitic. Enol., 1954, **7**: 211-14, bibl. 1, illus.

Investigations on the progeny of a Greco bianco × Precoce d'Ischia hybrid showed that in second-generation hybrids of *Vitis vinifera* there is a phylloxera resistance character which is effective and complete in a quarter of the population and is correlated with extreme smallness of grapes and bunches. Such resistant types could be of practical use in those cases in which grafting on resistant American vines upsets the physiological processes and adversely affects yield.

247. CELESTRE, M. R., AND MANZO, P.
Nuovi criteri di costituzione dei portainnesti Euro-Americani. (**Breeding new Euro-American rootstocks.**)
Riv. Vitic. Enol., 1954, **7**: 315-19, bibl. 1, illus.

In 1948 I.P.17, a phylloxera-resistant European hybrid bred in 1903, was crossed with the American vines, Riparia Gloire, Rupestris du Lot and 34 E. with a view to producing crosses more resistant to phylloxera than the older hybrids. In resistance tests specimens of the 3 new hybrids grown for 4 years beside the very vigorous but non-resistant Shiraz × 34 E. in infested ground gave average yields of wood of 1·24, 0·95 and 0·8 kg. per plant, compared with 0·42 kg. by Shiraz. In subsequent tests on the rooting of cuttings from vigorous specimens, the new Riparia Gloire and Rupestris du Lot hybrids showed a very high percentage take, namely 92 and 74–93, while 34 E. showed only 61–72. Tests on their value as rootstocks for the vigorous Italia began in 1954.

248. ANON.
La vigne. (**The vine.**)
Rapp. Cons. Exp. Rech. agron. Algér. 1953, 1954, pp. 184-98.

Bench grafting trials with hybrid direct producers. After tests for 4 years no serious incompatibilities in the combinations used were apparent. Rupestris du Lot gave the best results with the majority of scions used. 41-B and Téléki 8 gave good results, followed by 99 Richter; 216-3 Castel gave very uneven results with all the scions used. Seibel 8357 was an excellent scion on Rupestris du Lot, 41-B, Téléki 8 and 99 Richter; Seibel 7053 gave slightly less good results. The Seyve Villard hybrids on all 4 rootstocks gave sufficiently good results for practical use. *Comparative tests on sand stratification.* Two methods were used, one outside against an east wall, the other under glass on a bed of cold horse manure. Bench grafting by the whip method was used. Temperatures under glass varied between 8° and 27° C. at first, but finally remained between 17° and 19° C. Outside the temperature varied between 4° and 30° C. In general, results showed that plants on 41-B and Téléki 8 were better when stratified under glass, and those on 99 Richter and Rupestris du Lot gave better results following outside stratification. *Foliar diagnosis.* Studies in several vineyards showed the technique to be promising under Algerian conditions.

249. SHARPE, R. H.
Rooting of muscadine grapes under mist.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 88-90, bibl. 4.

Results of this study indicate that muscadine grape cuttings can be rooted quite readily by the constant-mist method. Succulent, immature tip cuttings gave the highest percentages of rooting. Half-mature to mature tips rooted poorly. [Author's summary.]—Fla agric. Exp. Stat., Gainesville.

250. POTAPENKO, JA, I.
Planting vines in groups on the square.
[Russian.]
Sad i Ogorod, 1954, No. 10, pp. 63-6, illus.

It is now recommended that vines should be planted in groups of 4 at 70 × 70 cm., with the centre of the groups 450 cm. apart. The plants are trellised obliquely to a height of about 3 m., each group forming a large "basin". The advantage of the system, method of erecting the trellises and conditions favourable for this type of spacing are described, and suitable, vigorous dessert varieties are listed. Modifications of the system, particularly for the reconstruction of old vineyards, are also suggested.

251. DARNAY, E.
A szőlő pótbeporzásakor jelentkező metaxénia. (**Metaxenia in grape vine following supplementary pollination.**) [English and Russian summaries ¾ p. each.]
Növénytermelés, 1954, **3**: 67-76.

When the vine variety Hamburg Muscat was cross pollinated with pollen of 9 other varieties, 6 of them increased the weight of normal grapes and reduced both the size and number of small grapes. Supplementary pollination also affected some fruit characters, including size of bunch, shape of berry, colour, time of ripening and in particular flavour, which resembled that found in the pollinator variety.

252. FILIMONOVA, L. I., AND ALJMENDINGER, O. E.
The knapsack pollen collector-duster SOA.
[Russian.]
Vinodelie i Vinogradarstvo, 1954, No. 4, pp. 47-8, illus.

For supplementary artificial pollination of vines pollen from wild vines with staminate flowers or, where not available, from bisexual cultivated varieties is used. For the pollination of 1 ha. of vineyard 500–900 g. dry pollen is needed. Pollen collection and pollination by hand is very slow and a portable apparatus has been developed capable of performing both operations at a greatly increased rate. The model, however, still needs to be improved.

253. Skrypnik, V. V.
The fruitfulness of vine buds. [Russian.]
Vinodelie i Vinogradarstvo, 1954, No. 4, pp. 28-9.

Causes of unproductive buds are discussed, and it is suggested that vines growing under inadequate soil moisture conditions produce large root systems for the development of which additional assimilates provided by vegetative shoots are required. The ratio between productive and unproductive shoots is regulated by the plant itself: the more assimilates are used for root development the less are there available for fruit bud initiation. For increased yields improvement of soil fertility and of water regime are recommended.

254. Streljnikov, I. G.
The influence of laterals on the productivity of shoots in the lower zone of bearing branches. [Russian.]
Vinodelie i Vinogradarstvo, 1954, No. 2, pp. 23-5.

Internodes from the lower, middle and upper parts of vine shoots were analysed in December, 1951, in the Kuban. It was found that the total N, albumen and starch contents of the internodes from all 3 parts was considerably higher when the shoots were grown with laterals than when without. The total dry matter content of the lower internodes from shoots with laterals was as high as that of the middle, and higher than that of the upper, internodes without laterals. In field trials during the following 2 seasons, pinching back laterals to the optimum number of leaves increased the number of inflorescences along the whole shoot, in particular those developing at the base.

255. Bezzubčenko, G. F.
Yield from vines in the third year from planting of cuttings. [Russian.]
Agrobiologija, 1954, No. 2, pp. 129-30.

Cuttings of the variety Plavaĭ were stored for 2 weeks in trenches and then planted out on well prepared ground in early May, 1950, at a distance of 1·20 m. within the row and 2·25 m. between the rows. They rooted, grew vigorously and were covered with soil for the winter. In the following spring the stems were cut back to 3–5 buds. During the summer the shoots were left untouched, but the top roots were pruned twice. The plants were staked and bordeaux was applied 4 times. In April, 1952, after uncovering and pruning to 4–5 shoots with 8–12 buds each, the stakes were removed and trellises were erected. Intensive soil cultivation carried out during the 2 preceding seasons was continued, as was the bordeaux treatment, and in the autumn an appreciable crop was gathered.

256. Alehin, K. K.
Training to accelerate bearing in young vines. [Russian.]
Vinodelie i Vinogradarstvo, 1954, No. 3, pp. 41-4, illus.

In the Taškent region, vines trained to a fan-shaped espalier by the method described began to produce within 3 years of planting.

257. Stoev, K. D., and Zankov, Z. D.
The time to prune vines. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **96**: 395-8, bibl. 9.

In experiments in Bulgaria with the variety Bolgar (Karaburnu) the effects of 6 pruning treatments, applied from after harvest till the new shoots were 5–6 cm. long, were studied. The smallest loss of carbohydrates, resulting in most vigorous growth and highest yield, was obtained from pruning during dormancy.

258. Stoev, K. D., Zankov, Z. D., and Nikov, M. M.
The effect of pinching of vine shoots on the invertase activity of leaves. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **96**: 657-9, bibl. 8.

Pinching back of vine shoots to prevent flower drop increases the synthetic action of invertase in the leaves The process is most active 5–8 days after pinching. With the resumption of lateral growth the effect of treatment on invertase activity disappears completely.

259. Timbrol Ltd., Sydney.
The use of parachlorphenoxyacetic acid for currant setting.
Tech. Inf. Sheet Timbrol Ltd. **2001,** 1954, pp. 3, bibl. 4.

Parachlorphenoxyacetic acid, PCA, gave a satisfactory set of currant grapes when sprayed at 20 p.p.m. per 100 gal. per acre. The best time for spraying was when most of the corolla caps had fallen, and the resultant fruit set and bunch weight were equal to, or greater than, those obtained by cincturing. There was some temporary distortion of young leaves and shoots.

260. Weaver, R. J.
Preliminary report on thinning grapes with chemical sprays.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 194-200, bibl. 5, illus.

Seventeen growth-regulators, defoliants, or thinning agents, each at three or four concentrations, were applied to grapes of *Vitis vinifera*. Solutions of sodium mono-chloroacetate, sodium dinitro-ortho-cresylate, ammonium dinitro-ortho-sec-butylphenate, sodium dinitro-o-cyclo-hexylphenate, and α-naphthaleneacetic acid, when applied at the proper concentrations, resulted in much injury to clusters but relatively little to foliage. Flower-cluster or cluster thinning by chemical sprays of cordon or head-pruned vines was successful after the shoots reached a length of about 15 inches or more. The distribution of clusters remaining after thinning with chemicals was poorer than after hand thinning on head-pruned vines. [From author's summary.]—Univ. Calif., Davis.

261. Asriev, E. A.
Foliar nutrition of vines. [Russian.]
Vinodelie i Vinogradarstvo, 1954, No. 3, pp. 45-8, bibl. 6.

In Krasnodar during the summer of 1953 repeated spray applications of P, PK, NPK, NPK+B+Mn and B were made on 18-year-old vines, variety Aligote. The sugar content of the juice was increased by all applications, the greatest increase of 1·6% over that of the control being produced by P and B. Acidity did not appear to be greatly affected by any treatment. The weight of bunches and berries and juiciness were improved by all sprays, the greatest increases being produced by PK. On yield NPK+B+Mn had the most favourable effect, whereas NPK alone did not increase yields. Fermentation was also improved by the B and Mn provided in the NPK+B+Mn treatment. The addition of minerals to the bordeaux treatment is recommended.

262. PORTJANKO, V. F.
A trial on foliar nutrition of vines. [Russian.]
Sad i Ogorod, 1954, No. 8, pp. 61-2.

Aqueous solutions of superphosphate, superphosphate plus boric acid and potassium chlorate alone and in combination with bordeaux were applied to vines from 10 June to 15 September at 7- to 12-day intervals. All treatments increased sugar content and yields and also improved frost resistance. The sprays should be applied in the morning or evening when dew is on the foliage, and in stronger concentrations on clear than on dull, cool days. Methods of preparing the solutions and, in the case of combined sprays, of counteracting unfavourable reactions are outlined.

263. SNYDER, E., AND HARMON, F. N.
Some responses of vinifera grapes to zinc sulphate.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 91-4, bibl. 9.

Tests of zinc sulphate of various strengths on fresh pruning wounds of the Muscat of Alexandria grape at different application times were made. In December, a solution of one-half pound per gallon gave a higher yield than the two pound per gallon solution and caused less bud injury. In February and March, the stronger solution (two pounds per gallon) was superior to the one-half pound per gallon solution. Applications made 24 to 72 hours after pruning resulted in better yields than those of the check vines but in lower yields than those of vines treated immediately after pruning. Summer foliage sprays of 20-10-100 zinc sulphate-lime-water mixture gave marked control of little-leaf in the new growth. [From authors' summary.]—U.S. Dep. Agric., Fresno, Calif.

264. AFRIKJAN, B. L., MARUTJAN, S. A., AND SAAKJAN, R. G.
Forms of reserve carbohydrates in vine. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **96**: 1195-6, bibl. 9.

Hemicellulose, in addition to being a cell wall component, appears, together with starch, to be a reserve carbohydrate in vines and to take an active part in their carbohydrate metabolism. The hemicellulose content of 8 varieties studied was much higher than their starch content. The contents of hemicellulose and starch were highest in October-November, and that of sugars in about February.

265. DURMIŠIDZE, S. V., AND NUCUBIDZE, N. N.
Chromatographic studies on the tannins of vine. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **96**: 1197-9, bibl. 6, illus.

Polyphenols in the seed, rachis and skin of grapes and in the leaves, shoots and roots of vines were investigated. When mature all organs contained l-gallocatechin, dl-gallocatechin, dl-catechin and, with the exception of the rachis, d-epicatechingallat.

266. RANZANI, G., AND OTHERS.
Vinhaça e adubos minerais. (1.) **(Lees and waste wine as fertilizer. (1.))** [English summary 1 p.]
An. Esc. sup. Agric. "Luiz de Queiroz" Piracicaba, 1953, **10**: 97-108, bibl. 5.

Lees and waste wine applied at the high rate of 1 million l./ha. [*sic*] with or without added complete fertilizer and Chile Nitrate was a better fertilizer for beans than complete fertilizer and Chile Nitrate. It is considered that this was due to (1) its raising of the pH value, (2) its high mineral content, and (3) its good effect on the soil structure.

Nuts.

(*See also* 112, 154, 885, 892.)

267. CLAPPER, R. B.
Chestnut breeding, techniques and results. II. Inheritance of characters, breeding for vigor, and mutations.
J. Hered., 1954, **45**: 201-8, bibl. 14, illus.

Although the work at Glenn Dale, Maryland, which is reviewed here is concerned primarily with the development of vigorous, blight resistant timber trees, there are several aspects of potential interest to nut production. Chestnut stigmas started to become receptive a few days after the staminate catkins began to blossom and showed maximum receptivity about 12 days later. Pollinations made in the morning were more effective than those made in the afternoon. Attempts to obtain viable seed by self-pollinating pistillate flowers after clipping off the styles failed, but viable seed was obtained by cross pollination. Tests showed chestnuts to be wind-pollinated. The time when flowering starts is determined by temperature departures from the mean for April and occasionally for April and May. The time of nut drop is determined by the time of flowering. Studies on vegetative propagation have shown that chestnuts can be grafted readily when both stock and scion are dormant, and interspecific bench and topwork grafts have been made successfully. Budding has proved more difficult, but spring budding when stock and scion buds are still dormant has shown promise. Numerous investigations on propagation from cuttings have shown greenwood cuttings to be usually the most satisfactory, but in no case has the percentage strike been high.

268. CROSS, F. B., HINRICHS, H. A., AND THOMSON, H. J.
Hayes and Patrick pecans. New varieties for the cracking trade.
Bull. Okla agric. Exp. Stat. **B-427,** 1954, pp. 7, illus.

These two pecan varieties were selected and named at the conclusion of an extensive survey of native pecans in Oklahoma carried out between 1946 and 1951. The main factors considered in the survey were productiveness, disease, especially scab, resistance, good shelling quality and high percentage kernel. The Hayes nut is medium sized (93 per lb.) and contains about

61% kernel. The Patrick nut is smaller (115 per lb.) with about 60% kernel. Notes are also given on 8 other varieties which were exceptional in one or more respects.

269. Zaprjagaeva, V. I.
Biological characteristics of pistachio in connexion with its cultivation in Tadzhikistan. [Russian.]
Bot. Žurnal, 1954, **39**: 326-42, bibl. 30, illus.

The growth of pistachio in general and the development of its root system in particular were studied. From his own observations and a review of literature the author concludes that pistachio is suitable for cultivation in southern Tadzhikistan where summers are hot and dry, and should play an important part in the afforestation programme of the area. The plants propagated by seed sown *in situ* can be grown successfully on unirrigated slopes up to elevations of 1,000–1,200 m. Of other woody species tested under similar conditions only *Amygdalus bucharica* grew satisfactorily, but after 17 years it was still unproductive.

270. Ščepotjev, F. L.
Heterogeneity of flowers in walnut *(Juglans regia)*. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **96**: 197-200, bibl. 5, illus.

Observations in the Ukraine in 1950 and 1951 showed that both staminate and pistillate flowers of walnut growing on the periphery of the crown opened earlier and were larger than those developing inside the crown. The peripheral pistillate flowers, better provided with nutrients and more readily pollinated than those inside the crown, produced larger nuts of better quality which ripened earlier, and when used for propagation made vigorous plants.

271. Krotkevič, P. G.
Walnut grafting. [Russian.]
Priroda, 1954, **43** (8): 107-9, illus.

To increase the frost resistance of walnuts grafting on hardy rootstocks such as *Juglans sieboldiana*, *J. mandshurica* and *J. nigra* is recommended. The method found most satisfactory is the inlay approach graft, using 2- to 4-year-old rootstocks and 2-year-old scions.

272. de Boer, S.
Proeven over het enten van noten 1949-1953. **(Experiments on grafting walnuts 1949-1953.)**
Jaarb. Proefstat. Boomkw. Boskoop 1953, pp. 35-40, bibl. 5, illus.

Experimental results from walnut-grafting showed that: 1-year-old *Juglans nigra* or *J. regia* may be used equally successfully as rootstocks; packing the rootstocks in moss had practical and economic advantages over potting; the stage of rootstock development had little influence on the union; basal and middle parts of well-ripened wood gave the best scions; grafting was best done in February or March, and whip grafting was the method preferably used.

Noted.

273.

a Bhargava, H. R.
Some abnormalities in two members of Solanaceae.
Sci. and Cult., 1954, **20**: 38-9, bibl. 3, illus.
Physalis peruviana and *Capsicum annuum.*

b Bradt, O. A.
New grape varieties and selections in Ontario.
Fruit Var. hort. Dig., 1954, **9**: 14.
Performance of French hybrids and new selections.

c Capucci, C.
La vite Maligia. Osservazioni e ricerche. **(The Maligia vine: notes and research.)** [English summary 8 lines.]
Riv. Fruttic., 1954, **16**: 81-111, bibl. 9, illus.
A white wine variety of the Imola hills.

d C[osmo], I.
Superficie vitata e produzione di uva e vino in Italia nell'anno 1953. **(Area under vines and production of grapes and wine in Italy in 1953.)**
Riv. Vitic. Enol., 1954, **7**: 214-19.

e Darrow, G. M., Scott, D. H., and Dermen, H.
Tetraploid blueberries from hexaploid × diploid species crosses.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 266-70, bibl. 4, illus.

f Duka, S. H.
A new early ripening strawberry variety, Kievskaja rannjaja No. 2. [Russian.]
Agrobiologija, 1954, No. 3, pp. 134-6.
The variety [Early Kiev No. 2] is vigorous, frost and drought resistant, large fruited and prolific.

g Gadras, M.
La rentabilité de la culture mécanique du vignoble. **(The possibilities of mechanization in vineyards.)**
Progr. agric. vitic., 1954, **142**: 190-7.

h van Hiele, T., and Slits, H. J. A.
Teelt, verpakking en verzending van aardbeien in Zuid-Frankrijk. **(Growing, packing and transport of strawberries in the South of France.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1954, **17**: 837-43, illus.

i Kuzjmin, A. Ja.
Vine breeding. [Russian.]
Agrobiologija, 1954, No. 3, pp. 82-93, bibl. in text, illus.
At the Central Genetical Laboratory, Mičurinsk.

j Ledin, R. B.
The Mysore black raspberry in Florida.
Fruit Var. hort. Dig., 1954, **9**: 10-11, illus.
A tropical species, *Rubus albescens.*

k Manzo, P.
I migliori apporti della genetica viticola. **(Masterpieces of vine breeding.)**
Riv. Vitic. Enol., 1954, **7**: 277-9, illus.
Regina dei Vigneti and Italia, table grape varieties.

l Meader, E. M., Smith, W. W., and Yeager, A. F.
Bush types and fruit colors in hybrids of highbush and lowbush blueberries.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 272-8, bibl. 9.
N. Hampshire agric. Exp. Stat., Durham.

m Morrow, E. B., Darrow, G. M., and Scott, D. H.
A quick method of cleaning berry seed for breeders.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 265.
In a Waring Blendor.

n Peralta, G. J.
The vines and wines of Malta.
Brit. agric. Bull., 1954, **7**: 144-7, illus.

o Slate, G. L., and Klein, L. G.
A second report on the breeding of purple raspberries.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 262-4, bibl. 1.
Black × red raspberry hybrids. [See also *ibid.*, 1933, **30**: 108-12.]

p Turkovic, Z.
Vitis silvestris Gmelin scoperte in Jugoslavia. **(*Vitis silvestris* recorded in Jugoslavia.)**
Riv. Vitic. Enol., 1954, **7**: 139-46, bibl. 10, illus.
See also *H.A.*, 24: 1295k.

q Wilson, W. F., Jr., and Giamalva, M. J.
Days from bloom to harvest of Louisiana strawberries.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 201-4.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(*See also* 274, 413o, 414g, h, l, 1151, 1158.)

274. (Rosa, M.)
Contributo ad una bibliografia fitopatologica italiana per l'anno 1953. **(Contribution to an Italian plant pathology bibliography for 1953.)**
Bol. Staz. Pat. veg. Roma, 1953 (issued 1954), **11**: 295-306, bibl. 245.

Temperate top and soft fruit, nuts, vines, tobacco, vegetables, flowers, citrus and olives are among the horticultural crops covered.

275. Sibilia, C.
La Stazione di Patologia Vegetale di Roma. **(The Rome Plant Pathology Station.)**
Bol. Staz. Pat. veg. Roma, 1953 (issued 1954), **11**: 3-19, illus.

Information is given on the new quarters at Via Casal de' Pazzi 250, into which the Station moved in 1952/53, its equipment and its experimental plots of 28,000 sq.m.

276. Deutscher Pflanzenschutzdienst.
Jahresberichte der Pflanzenschutzämter 1952. **(Annual Reports of the Institutes of the West-German Plant Protection Service for 1952.)**
Biologische Bundesanstalt für Land- und Forstwirtschaft, Braunschweig, 1954, pp. 144, bibls.

Seventeen Institutes of the Plant Protection Service in the Federal German Republic report on their activities in 1952.

Disturbances of nutrition or of unknown origin.

(*See also* 28, 73, 207, 412.)

277. Branas, J., and Bernon, G.
Sur la carence de bore. **(Boron deficiency.)**
Progr. agric. vitic., 1954, **142**: 239-43, bibl. 6.

Boron deficiency symptoms are described as observed on vines in the Eastern Pyrennees. Symptoms varied with the severity of the attack, but shortened internodes, tip die-back, leaf mosaic and curling, inflorescence drop, and internal necrosis of the berries, were among those noted. An increase in leaf sugars could be detected before visible symptoms appeared. Soil applications of borax are considered to be most effective in correcting the deficiency.

278. Bould, C.
The use of iron chelates for the control of lime-induced chlorosis in fruit: Progress Report I.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 91-5, bibl. 9, illus.

It would appear from preliminary experiments that Fe-EDTA is not effective under alkaline soil conditions when used at rates that are effective under acid soil conditions. When injected into trees at a rate equivalent to the iron in ferrous sulphate it was not so effective as the latter. Foliage sprays caused damage at concentrations in excess of 0·1%. Of the crops tested susceptibility to spray damage was in the order pear > plum > red currant. The response to foliage sprays of 0·1% concentration was only partial and probably two or more sprays at intervals of 2–3 weeks would be necessary to produce a complete seasonal control of lime-induced chlorosis. [From author's discussion.]

279. Stenuit, D., and Piot, R.
Symptomes de carence en magnésie chez les plantes agricoles et horticoles. **(Symptoms of magnesium deficiency in agricultural and horticultural crops.)**
[*Publ.*] *Serv. pedol. Belgique*, 1954, pp. 61, illus.

Magnesium deficiency symptoms in tobacco, peas, beans, spinach, cauliflowers, lettuces, leeks, apples, pears, grapes, red currants, peaches, roses, cherries and poplar are shown by colour photographs. The brief descriptive text is in French, Flemish, English and German.

280. Bailey, J. S., and Drake, M.
Correcting magnesium deficiency in cultivated blueberries and its effect on leaf potassium, calcium, and nitrogen.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 95-100, bibl. 6.

In the fall of 1949 magnesium was supplied to Mg-deficient plants of the cultivated blueberry by soil applications of Epsom salts and dolomitic limestone. During the experiment leaf Mg increased significantly in both treated and untreated plots. However, at the end of the experiment the differences in leaf Mg between treated and untreated plots were significant. Leaf K decreased from September 1949 to July 1950 on all plots, but there was little change thereafter. Mg application had no effect on K content of leaves. Leaf Ca was not affected by Mg application, was higher in the fall and was not increased by the application of 3,000 pounds of lime. Leaf N increased consistently from July to September 1951, but was not related to Mg application. As much as $1\frac{1}{2}$ tons of lime per acre did not cause chlorosis on a soil with pH of about 4. Twenty-five pounds per acre of MgO as Epsom salts or 200 pounds MgO per acre as dolomitic limestone practically eliminated deficiency symptoms. [From authors' summary.]—Mass. agric. Exp. Stat.

281. Dunn, S., and Roberts, S. S.
The availability of magnesium from organic carriers in artificial substrates.
Plant Physiol., 1954, **29**: 337-42, bibl. 9.

Several organic carriers of magnesium were tested in comparison with magnesium sulphate regarding their suitability for alleviation of apple leaf scorch. Apple and corn seedlings were grown in sand and water cultures, without pH control, and the effect of the Mg carriers on dry weight yield calculated. Of the compounds tested magnesium thiocyanate and salicylate were toxic, and 14 of them gave no benefit. Seven were more beneficial than sulphate to both corn and apple growth; these were: acetate, formate, phthalate, ammonium phosphate, malate, lactate and fumarate. Propyl phosphate was beneficial for apple but not for corn.—New Hampshire agric. Exp. Stat.

282. Cais, D.
Note preliminari su una malattia della vite riscontrata nel Veronese. (**Preliminary notes on a vine disease observed in the Verona district.**)
Riv. Vitic. Enol., 1954, **7**: 164-7, illus.

An account is given of the symptoms and incidence of a physiological disorder of vines observed in several localities near Verona in 1952. The chief symptoms are arrested growth, stunting, curl, chlorosis and partial desiccation of the leaves, flower drop, and discoloration and desiccation of the grapes. Affected vines do not die but their yield is seriously reduced. The disorder is more severe after a dry spring and has been observed only on heavy clays. White varieties, especially Garganega, are more susceptible than black; scions on both 420 A and Rupestris du Lot, the commonest local rootstocks, are affected. In control experiments phosphorus cured the disorder completely while minor elements increased extension growth.

283. Ackley, W. B.
Hard-end of the Bartlett pear and its possible association with various water relationships of the fruit and leaves.
Tech. Bull. Wash. agric. Exp. Stats **15**, 1954, pp. 35, bibl. 92, illus.

Hard-end of pears, a physiological disorder, is known to be non-transmissible, to occur in arid or semi-arid regions, and to be associated with the Japanese rootstock, *Pyrus serotina*. The water relations of leaves and fruits of Bartlett pears were studied in Washington through the 1949-52 growing seasons. Trees growing on Japanese stocks had lower leaf water contents, higher water deficits, and higher osmotic concentrations of leaves and fruits than those growing on French rootstocks, *Pyrus communis*.

Climatic factors.

(*See also* 8, 103n, 118, 151, 181, 413c, g, z.)

284. Instituut voor toegepast biologisch Onderzoek in de Natuur.
Verslag over het jaar 1953. (**Report for 1953.**)
Meded. Inst. toegep. biol. Onderz. Natuur, **16**, 1954, pp. 32.

The insect population of an orchard was not found to be affected by the presence of a windbreak. In contrast to the previous year's results, trees nearest the windbreak had a lower yield than those further away.

285. Nigond, J.
L'appréciation du risque dans le lutte contre les gelées printanières des arbres fruitiers dans la région parisienne. (**An estimation of frost risk in the control of spring frost damage on fruit trees in the Paris area.**)
Ann. Agron., Sér. A, 1954, **5**: 321-38, bibl. 12.

Data recorded at Versailles between 1929 and 1952 on the occurrence of spring frosts were studied and from them the frost risks to apples and pears were deduced. Critical years were considered to be those in which temperatures below –4° C. occurred during the pink bud to full-bloom stages, and those in which the trees reached full-bloom without damage but in which temperatures below –3° C. occurred at this time. For pears critical years occurred once in every 2 years, and in each year of occurrence there were on the average 3 serious frosts requiring a total of 12 hours control. The risk for apples was not so great owing to their later flowering period, and there was on the average one critical year in every 3, during which 2 or 3 frosts occurred lasting for a total of 9 hours. To protect an orchard against most frosts, the temperature must be raised by 3° for pears, and by 2° for apples. The control of frosts by artificial cloud formation only raises the temperature 0·5°, thus the efficiency of this method is limited. Heating and mixing the air, and the use of irrigation equipment gave much better results, but were expensive. Chemical treatments, which can delay flowering by 15 days, would reduce the number of critical years by half. The author concludes that the use of combined biochemical and physical control methods will prove efficacious and will be cheaper than present methods.

286. Brierley, W. G., and Landon, R. H.
Effects of dehardening and rehardening treatments upon cold resistance and injury of Latham raspberry canes.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 173-8, bibl. 11.

These studies show that if Latham raspberry canes are dehardened in early winter in Minnesota, and buds do not become active, it is possible for the canes to reharden to some extent. But the results obtained make it appear unlikely that fully dehardened canes can reharden enough to escape injury at temperatures below 0° F. If bud temperatures do not rise to the point at which growth begins (about 43° F.) some rehardening may occur in the field under alternating temperatures. But if bud development occurs, it is likely that injury will follow any subsequent exposure to temperatures lower than +20° F. [From authors' conclusions.]—Minn agric. Exp. Stat. St. Paul.

287. Gigante, R.
L'albicatura nervale delle foglie di pesco. **(Vein whitening in peach leaves.)** [English summary 5 lines.]
Bol. Staz. Pat. veg. Roma, 1953 (issued 1954), **11**: 125-31, bibl. 6, illus.

The alteration described consists of white bands along the veins, more distinct on the lower than on the upper surface. It is caused by low temperatures and is due to the separation of the epidermis on the lower surface from the spongy tissue.

288. Tukey, L. D.
Peach doubles.
Amer. Fruit Gr, 1954, **74** (10): 11, illus.

Doubling of peach and other stone fruits such as cherries is attributed to high temperatures, or high sunlight intensities during the preceding summer at the time of blossom bud differentiation. Local water deficiency is also possibly a factor.

289. Sommer, N. F.
Branch wilt of the walnut tree in relation to sunburn damage.
From abstr. in *Phytopathology*, 1954, **44**: 506-7.

Branch wilt (*Hendersonula toruloidea*), a destructive disease of Persian walnuts, has been shown to be intimately associated with sunburn damage. Naturally infected branches almost invariably show signs of prior sunburning. The pathogen, therefore, intervenes to convert a comparatively minor damage into severe injury and death to fruiting branches. [From author's abstract.]

290. Bovay, E.
Les dépôts de chlore et de fluor sur la végétation dans le voisinage des usines de produits chimiques. **(Chlorine and fluorine deposits on vegetation in the vicinity of chemical factories.)**
Rev. romande Agric. Vitic., 1954, **10**: 69-71, illus.

The vine, the apricot and the chestnut are among the species most susceptible to fluorine injury, while the apple and the pear are more resistant. Fluorine causes brown or red, sharp-edged burns at the margin or tip of the leaf, affected parts soon falling. Chlorine causes more or less pronounced leaf discoloration but is much less injurious. Investigations in 1952 and 1953 showed that species susceptible to fluorine damage, such as the apricot, display symptoms at fluorine concentrations of 3 mg. per 100 g. dry leaf matter. At 1-3 mg. there are generally no burns, but the vegetation may be adversely affected. Ordinarily fluorine is present on foliage at rates below 1 mg. With chlorine no burning was observed even at 1,000 mg.

Viruses.

(*See also* 413b, d, j, k, l, u, 414b, j, 1139, 1154.)

291. Luckwill, L. C.
Virus diseases of fruit trees. IV. Further observations on rubbery wood, chat-fruit and mosaic in apples.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 40-6, bibl. 4.

The distribution of latent rubbery wood virus in samples of M.I and M.II rootstocks from stoolbeds in different parts of the country was investigated by working them with virus-free Lord Lambourne. No rubbery wood virus was found in any of the seven samples of M.II tested. Only two out of six samples of M.I proved to be virus-free. Both these came from old-established nursery firms who obtained their parent stocks prior to 1930. Samples of seven different Malling stocks from the Long Ashton stoolbed were indexed for latent chat-fruit virus using Lord Lambourne as an indicator. 22% infection was found in M.IV, 6% in M.XVI and 4% in M.XII. Stocks M.I, II, VII and IX appeared to be free of chat-fruit virus. The tolerance of 42 varieties of apple to the vein-banding strain of apple mosaic virus was investigated. Seven were found to be tolerant, 13 partially tolerant and 22 susceptible. Transmission tests with buds taken from large apple trees showing localized mosaic symptoms showed that in some the virus was not fully systemic, even though they had been infected for at least eight years. [Author's summary.—For an earlier report see *H.A.* 20: 2494.]

292. Smith, W. W.
Occurrence of "stem pitting" and necrosis in some body stocks for apple tree.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 101-13, bibl. 26, illus.

The varieties McIntosh, Cortland, and Spy, top-worked onto the Virginia and Florence crab intermediate stocks, came into production as quickly as trees budded directly onto domestic roots. The trees in which the intermediates rooted made excellent growth and production during the twelve-year study. Trees of the same scion-intermediate stock combination that did not form roots on the intermediates became dwarfed, developed "wood pitting" in the intermediate stock and broke down. Since the intermediates were on domestic roots, the difference in performance of the trees must be due to variation in the domestic roots used for understocks. The inconsistent incompatibilities of Virginia Crab with commercial apple varieties that have been reported in the literature may well be a result of the heterogeneous seedlings that were used for nurse roots, or of the nurse roots' response to a virus, and not an actual difference in the Virginia

Crab or in the varieties with which they were grafted. The "wood pitting" and general appearance and behavior of the abnormal trees have a striking resemblance to those seen in citrus trees infected with the virus disease "quick decline". [Author's summary.]—N. Hampshire agric. Exp. Stat., Durham.

293. Millikan, D. F., and Guengerich, H. W.
Bark splitting, a possible virus disease in apple.
From abstr. in *Phytopathology*, 1954, **44**: 498.

For several years a disorder has been observed on double worked Virginia Crab characterized by severe longitudinal cracking on the stem between the ground line and the first scaffold branches. This may be accompanied by long willowy growth of the top-worked variety. Budding experiments on a number of pome and stone fruit stocks suggest that the disorder is of virus origin.

294. Refatti, E., and Ciferri, R.
La virosi del tipo "scopazzi" in vivai di melo. (**The witches' broom virus disease in an apple nursery.**) [English summary, 11 lines.]
Ann. Sper. agrar., 1954, **8**: 1543-56, bibl. 5, illus.

A witches' broom disease observed in the province of Trentino in nursery plants of the apple varieties Reinette Champagne, Reinette du Canada, Morgenduft, Golden Delicious and, occasionally, Jonathan, is characterized by development of dormant axillary buds and enlargement of the stipules. The disease, which is transmitted to and from grafted buds, is probably the same as that met with in adult plants in the province of Verona and also known in Holland and Switzerland.

295. Kirkpatrick, H. C., and Lindner, R. C.
Studies concerning chemotherapy of two plant viruses.
Phytopathology, 1954, **44**: 529-33, bibl. 16.

Studies are described in which it was shown by spectrophotometric and biological methods that chloramphenicol, thiouracil and guanazola have marked inhibitory effects on a stonefruit virus and tobacco mosaic virus.—Tree Fruit Exp. Stat., Wenatchee, Washington.

296. Ciferri, R., and Scaramuzzi, G.
La "sharka" o "vaiolatura ad anello" del susino, grave malattia da virus in Iugoslavia. (**Ring-spot of plum, a serious virus disease in Jugoslavia.**)
Riv. Ortoflorofruttic. ital., 1954, **38**: 315-20, illus.

Information is given on the ring-spot virus disease of plums in Jugoslavia, the varieties attacked and their relative susceptibility, and the leaf and fruit symptoms. Spread is believed to be due chiefly to the distribution of infected plant material, not to aphids.

297. Fridlund, P. R.
The reaction of *Prunus tomentosa* seedlings to latent *Prunus* virus cultures.
From abstr. in *Phytopathology*, 1954, **44**: 488-9.

An account is given of inoculation tests which showed that *Prunus tomentosa* seedlings are satisfactory for the detection and identification of necrotic ring spot virus.

298. Millikan, D. F.
Quantitative differences in the nucleic acid composition of cherry leaves collected from ring-spot-infected and disease-free Montmorency cherry.
From abstr. in *Phytopathology*, 1954, **44**: 498.

Ring-spot-infected cherry leaves contained approximately 50% more ribonucleic acid than did disease-free leaves.

299. Cameron, H. R.
A bark splitting virus disease in Montmorency sour cherry.
From abstr. in *Phytopathology*, 1954, **44**: 484.

In 1950 3 sources of budwood of Napoleon sweet cherry that gave differential reactions for virus on Japanese flowering cherry in Oregon were indexed on sour cherry in Wisconsin. In 1951, certain Montmorency trees, used to index each of the 3 sources, developed a severe bark splitting and gumming, primarily on the current season's terminal growth. All 3 of the bark splitting sources produced a dieback and bark splitting when they were graft transmitted to Scout apricot. [From author's abstract.]

300. Afanasiev, M. M., and Morris, H. E.
Spread of Lambert mottle virosis of sweet cherry in Montana.
From abstr. in *Phytopathology*, 1954, **44**: 481.

Lambert mottle virosis, found only in the Lambert and Peerless varieties, causes definite economic losses since infected trees very often die within 3 years. Positive transmission was obtained by bud inoculation. The method of spread within an orchard is described.

301. Darrow, G. M., Goheen, A. C., and Miller, P. W.
The importance of virus diseases in the cultivation of strawberries in the United States.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 547-52, bibl. 25.

The problem of virus diseases in commercial production of strawberries and the measures taken by the U.S. Department of Agriculture to overcome the problem are briefly reviewed under the headings: Different viruses and diseases; Origin of strawberry viruses; Specific and varietal responses; Vectors; Distribution of viruses; Obtaining virus-free stocks; Virus-free *versus* tolerant varieties; Propagating and introducing virus-free stocks; Future of virus-free stocks.

302. Miller, P. W.
Indexing strawberries infected with non-persistant viruses by use of detached leaves and aphids.
Plant Dis. Reptr, 1954, **38**: 568-71, bibl. 9.

Recommended procedure is as follows: A young leaf, ¼- to ½-grown, is detached from the plant being indexed, and placed with the lower surface up on moistened filter paper in a covered petri dish or in a plastic-covered dish; 15 aphids are transferred with a moistened camel's-hair brush from a virus-free stock colony to the lower surface of the leaf, and the dish is placed in a darkened room or cupboard at room temperature. Forty-eight hours later, the aphids still alive are transferred to a healthy *F. vesca* (East Malling strain) indicator plant where they are allowed to feed for 72 hours, and are then killed by fumigation. The indicator plant is then incubated in a greenhouse at about 70° F. When the plant being indexed is infected, virus symptoms are generally visible on the indicator plant in ten days to two weeks time.—Hort. Crops Res. Branch, Agric. Res. Serv., U.S. Dep. Agric. Corvallis Ore.

303. FULTON, J. P.
Heat treatments of virus-infected strawberry plants.
Plant Dis. Reptr, 1954, **38**: 147-9, bibl. 5.

Virus infected plants were successfully held for 6 months in plastic covered chambers in a glasshouse maintained at a minimum temperature of 31° C., in which, moreover, in summer the day temperature often rose to 48° C. As a result the virus content became modified and showed milder symptoms. Plants were stunted by the process but retained a fair capacity for making runners.

304. MILLER, P. W.
Effect of hot-water treatment on virus-infected strawberry plants and viruses.
Plant Dis. Reptr, 1953, **37**: 609-11, bibl. 9.

In trials at Corvallis, using exposure times of ½ to 7 hours and temperatures of 109°–120° F., 796 out of 1,136 treated plants died. Fifty-seven had the viruses inactivated by the treatment. Out of this number, 31 later succumbed and 26 were still alive and free from virus infection 4–8 months after treatment. It is suggested that hot water treatment may prove a possible means of getting disease free clones of certain varieties now 100% infected.

305. FULTON, R. H.
Studies on inactivation of the strawberry Type 2 virus *in vivo*.
From abstr. in *Phytopathology*, 1954, **44**: 489.

In tests with Robinson strawberries type 2 virus had a thermal inactivation range of 36–40° C., the best treatment being at 38° C. for 8 days. In chemical inactivation tests with inorganic and antibiotic compounds inactivation was only achieved with 2% zinc chloride or 2% zinc sulphate.

306. HEWITT, W. B.
Some virus and virus-like diseases of grapevines.
Bull. Calif. Dep. Agric., 1954, **43**: 47-64, illus.

Virus diseases occurring in Californian vineyards are described; these are fanleaf [infectious degeneration], yellow mosaic, white emperor and Pierce's disease. Virus-like diseases which cannot be attributed to any known cause are unfruitful vine, enation, asteroid leaf spot, rough bark, leaf roll, and spindle shoot. Little leaf, a Zn deficiency disease, is also included as it may be confused with these. Colour photographs are given of white emperor, leaf roll, yellow mosaic and unfruitful vine leaf symptoms. The diseases are all spread in propagating wood, hence the best control is to avoid using infected material.

307. ALGHISI, P.
Sulla degenerazione infettiva della vite.
(On infectious degeneration of the vine.)
[English summaries 15, 6 and 6 lines.]
Ann. Sper. agrar., 1954, Vol. **8,** No. 3, Suppl., pp. xxxvii-lxxxi, illus., No. 4, Suppl., pp. i-xvi, No. 5, Suppl., pp. i-xxxviii, bibl. 413, illus.

History of the disease, symptoms, the intracellular cords, stunting of various types, transmission of the disease and factors favouring its appearance, theories on its nature, and control. Control can be summarized as the eradication of diseased vines and the use of healthy plant material in establishing a vineyard.

Bacteria.

(*See also* 413m.)

308. GOODMAN, R. N.
Development of methods for use of antibiotics to control fireblight (*Erwinia amylovora*).
Res. Bull. Mo. agric. Exp. Stat., **540,** 1954, pp. 16, bibl. 15, illus.

In Missouri laboratory experiments showed that *Erwinia amylovora* was inhibited *in vitro* by terramycin, streptomycin and thiolutin. In greenhouse studies foliar sprays of terramycin and streptomycin, alone and in combination, were capable of controlling fireblight in inoculated 1-year-old Jonathan apple trees. Orchard trials on mature Jonathan trees confirmed these findings; complete and lasting inhibition of fireblight could be obtained by sprays of streptomycin at 100 p.p.m., when the spray schedules were started early in the flowering period. Schedules started at early petal fall and calyx stages allowed some development of blossom blight, but were nevertheless capable of significantly reducing shoot blight infection. (See also *H.A.*, 24: 1333.]

309. KIRBY, R. S.
Effectiveness of antibiotics for apple fire blight control under epidemic conditions in Pennsylvania.
Plant Dis. Reptr, 1954, **38**: 432-3.
Antibiotics for apple fire blight.
Agric. Chemls, 1954, **9** (10): 60.

In a 10-year-old apple orchard, mainly Opalescent and Gravenstein, a fireblight epidemic was almost entirely controlled by two blossom sprays of Agrimycin normal strength at 9·34 oz. per 100 gallons, 2·2 gallons per tree. Pheno-lead gave limited control but the normal spray schedule very little.—State Coll. Pa.

310. WINTER, H. F., AND YOUNG, H. C.
Streptomycin most effective in controlling fireblight of apple and pear.
From abstr. in *Phytopathology*, 1954, **44**: 511.

Streptomycin gave excellent control of fireblight (*Erwinia amylovora*) in orchard tests on Jonathan apples and Bartlett pears when applied at 100 p.p.m.

at early bloom, full bloom and petal fall. [See also *H.A.*, 24: 2446.]

311. Dunegan, J. C., and others.
Control of pear blight by a streptomycin-terramycin mixture.
Plant Dis. Reptr, 1954, **38**: 666-9, bibl. 5, and Abstr. in *Phytopathology*, 1954, **44**: 487.

Streptomycin-terramycin mixture spray proved highly effective in controlling pear blight (*Erwinia amylovora*) without causing the severe russet resulting from the use of copper sprays or dusts. The lowest concentration giving results comparable with results from copper sprays was a 30–3 p.p.m. mixture applied 5 times. [See also *H.A.*, 24: 2442.]

312. Ark, P. A., and Scott, C. E.
Antibiotics as protectants against fireblight.
From abstr. in *Phytopathology*, 1954, **44**: 481.

Among antibiotics tested for the control of fireblight (*Erwinia amylovora*) on Bartlett pears in California streptomycin sprays were better than the standard copper-lime dust, and neomycin reduced incidence considerably. Streptomycin dust gave variable results and no effect was caused by trunk injections of dry streptomycin or by aureomycin sprays.

313. English, H., and Hansen, C. J.
Experiments on the control of bacterial canker of stone fruit trees.
From abstr. in *Phytopathology*, 1954, **44**: 487.

Bordeaux mixture gave varying results in the control of bacterial canker, *Pseudomonas syringae*. On young apricots organic mercury compounds were less effective than copper. For plum Lovell peach was a more resistant rootstock than Marianna plum. Resistant and susceptible plum varieties are listed.

314. Yamamoto, Y., Ōgaki, C., and Tatsuno, Y.
Experiments and investigations on the bacterial spot of peach. I. Effects of weather conditions on outbreak of the disease, and susceptibility in the varieties of peach. II. Experiments of control methods. (1). [Japanese with English summary, ½ p.]
Bull. hort. Sect. Kanagawa agric. Exp. Stat., 1953, No. 1, pp. 57-62, bibl. 7, illus., 62-7.

Six commercial peach varieties are classified according to their susceptibility to bacterial spot (*Xanthomonas pruni*). Under bad weather conditions bordeaux mixture, zinc sulphate plus lime and a proprietary preparation gave little or no control.

315. Dunegan, J. C., Wilson, R. A., and Morris, W. T.
Effects of terramycin on peach trees affected with bacterial spot.
Plant Dis. Reptr. 1953, **37**: 604-5.

In a second year's trials terramycin-injected peach trees dropped fewer leaves and showed less infection from bacterial spot (*Xanthomonas pruni*) than non-injected trees. No definite recommendation can, however, yet be made.—Bur. Plant Ind., Beltsville Md.

316. Powell, D., Adam, A. V., and Anderson, H. W.
Relationship between timing of bactericidal applications and spring canker development on peaches.
From abstr. in *Phytopathology*, 1954, **44**: 502-3.

One to three applications of copper sulphate, hyamine 1622 or neomycin were made on inoculated Elberta peaches between the beginning of August and mid October. Best control of spring canker of *Xanthomonas pruni* was obtained with 3 sprays either on August 1 and 16 and September 4 or on August 16 and September 4 and 18.

Fungi.

(*See also* 413h, s, w, x.)

317. Kirby, R. S.
Relation of rainfall to occurrence of apple scab and sooty blotch.
From abstr. in *Phytopathology*, 1954, **44**: 495.

A 25-year census in Pennsylvania showed that (1) the amount of scab occurring in any year in unsprayed orchards was proportional to the amount of rainfall in April and May and to a lesser extent in June and July: and (2) the amount of sooty blotch was proportional to rainfall in July and to a lesser extent in August and September. The incidence of both diseases varied little between the first and second 10-year period and the final 5-year period.

318. Baumeister, G.
Weitere Untersuchungen zur Biologie des Apfelschorfes. (**Further studies on the biology of apple scab.**)
Mitt. biol. Bundesanst. Berlin-Dahlem, 1954, Heft 80, pp. 98-102, bibl. 3.

Further studies on the light requirements for the discharge of *Venturia inaequalis* spores are briefly reported (see also *H.A.*, 23: 4008) and observations on the periodicity of "scab years" during the period 1942–1952 are noted. It appears that on unsprayed trees heavy infections occur only every second year. This may be due to the inability of the asci to develop fully on leaves overcrowded with perithecia. The only exception to the rule was the very dry summer of 1947.—Obstbau-Versuchsanst. Jork.

319. Byrde, R. J. W., Fielding, A. H., and Harper, C. W.
Spraying experiments against apple and pear scab at Long Ashton, 1953.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 167-70, bibl. 6.

Captan at 0·1% gave significantly better control of apple scab, *Venturia inaequalis*, on fruits of Cox's Orange Pippin and a significantly greater crop than a standard lime sulphur programme. There was some indication, however, that the material may have little or no effect on apple mildew, *Podosphaera leucotricha*. Both captan at 0·1% and 2-heptadecyl glyoxalidine at 0·125% as post-blossom scab sprays showed little or no phytotoxicity towards sulphur-sensitive apple and pear varieties.

320. Schaberg, —.
"Changer le fusil d'épaule en cours de route, vaut toujours mieux que de perdre la partie." **(Change your methods and beat scab.)**
Fruit belge, 1954, **22**: 129-32, 147-52.

The author recommends a spray schedule for scab control on apples and pears as follows: *Pre-blossom sprays:* 0·5% copper oxychloride, at bud-burst, for pears with scab-infected branches, followed by 2 organic mercurial sprays; 3 organic mercurial sprays for pear varieties less susceptible to scab; organic mercurial sprays for apples, starting at the mouse-ear stage. *Blossom sprays:* zinc carbamate for apple and pear varieties susceptible to scab, and TMTD for those less susceptible. *Post-blossom sprays:* 2 or 3 applications of zinc carbamate followed by TMTD for varieties susceptible to scab, and TMTD for other varieties.

321. Kearns, H. G. H., Marsh, R. W., and Morgan, N. G.
Spray application problems: XII. Further field experiments on the control of apple scab by small-volume sprays.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 149-53, bibl. 1.

In a season favouring apple scab attack, large-volume spraying applied by lances (> 500 gal. per acre), using lime sulphur at not more than 1% with a wetter, gave excellent control of the disease. Air-flow small-volume spraying, at 100–150 gal. per acre. using the same concentrations of lime sulphur at the same times as for the large-volume applications, gave an unsatisfactory control of scab. [Authors' summary.]

322. Plasman, A.
Essai de lutte contre la tavelure du pommier et du poirier par destruction des formes hivernantes au moyen de pulvérisations automnales. **(Control of apple and pear scab by destroying overwintering forms by autumn sprays.)**
Fruit belge, 1954, **22**: 143-4.

During October trees of Cox and Comice were sprayed to control the formation of perithecia of scab (*Venturia inaequalis* and *V. pirina*). Ammoniacal DNOC at 0·8% and 1·6% gave excellent control: copper oxychloride and lime sulphur were not satisfactory. [See also *H.A.*, 24: 287.]

323. Byrde, R. J. W., and Corke, A. T. K.
The role of eradicant fungicides in the control of apple canker. II.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 159-62, bibl. 2.

Laboratory examination of cankers treated in the field with eradicant fungicides confirmed that phenyl mercury chloride (0·3%) had a prolonged effect in reducing the sporulation of *Nectria galligena*. Sodium pentachlorophenate and pentachlorophenol were less effective. The subsequent growth of established cankers was not arrested by the fungicide treatments. [Authors' summary.—For an account of earlier work see *H.A.*, 22: 3600.]

324. McIntosh, D. L., and Mellor, F. C.
Crown rot of fruit trees in British Columbia. III. Resistance trials on apple seedlings obtained from controlled crossings.
Canad. J. agric. Sci., 1954, **34**: 539-41, bibl. 2.

Apple seedlings raised from crosses between parents susceptible and resistant to crown rot, caused by *Phytophthora cactorum*, were inoculated with a mixed culture of 5 isolates. The percentage of crown rot of each group of seedlings was as follows: resistant × resistant, 7·2; resistant × susceptible, 23·5; susceptible × susceptible, 93·3.

325. Sprague, R.
Apple powdery mildew spray trials, 1953.
Plant Dis. Reptr, 1953, **37**: 601-3.

Tabulated results of the application at different times and in different amounts of various fungicides on the severity of apple mildew (*Podosphaera leucotricha*). Among the materials applied were polysulphide, lime-sulphur, karathane, phygon XL, colsul, captan and ovotran.—Tree Fruit Exp. Stat., Wenatchee.

326. Kotlaba, F.
Hrotnatka zápašná—*Sarcodontia crocea* (Schw.) Kotl., nebezpečný ničitel našich jabloní. **(*Sarcodontia crocea*, a dangerous parasite of apple trees in Czechoslovakia.)** [English and Russian summaries, 1 p. each.]
Preslia, 1954, **26**: 183-92, bibl. 17, illus.

Sarcodontia crocea, syn. *Hydnum setosum*, *H. foetidum* and others, attacks the wood and causes serious losses in many apple growing regions which have damp climates and frequent frosts. For control, the burning of infected wood is recommended.

327. Darley, E. F., and Wilbur, W. D.
Some relationships of carbon disulfide and *Trichoderma viride* in the control of *Armillaria mellea*.
From abstr. in *Phytopathology*, 1954, **44**: 485.

Previous laboratory studies demonstrated that sublethal dosages of CS_2, while not killing *A. mellea* in roots, directly initiated biological control by stimulating *T. viride* to invade and kill *Armillaria* 30 days later. Further studies have confirmed this and have shown that with lethal doses of CS_2 *Trichoderma* is incidental to control. *Trichoderma* was stimulated to lethal activity in fumigated soils at standard or reduced dosages only if *Armillaria*-infected roots were present. *Trichoderma* did not develop in the field wherein roots were buried 18 days after fumigation or in soils in jars which were fumigated and aerated prior to introduction of roots. Once *Trichoderma* was stimulated in fumigated soil containing infected roots, its lethal activity continued for at least 3 months. [From authors' abstract.]

328. Michiels, —., Questienne, —., and Semal, —.
La protection des fruits contre la moniliose pendant la conservation. **(Protection of fruit against brown rot during storage.)**
Fruit belge, 1954, **22**: 134-8.

Experiments showed that conidia of *Sclerotinia fructigena* would germinate at 3° C. in 90% humidity or higher. Trials with Reinette grise apples, which were dipped in fungicidal solutions and then inoculated, showed that SR406 and aminol (a quarternary ammonium compound) gave very good control of brown rot. Aminol did not taint the fruit, it was persistent for at least a month, and acted equally well at temperatures of 3°, 8° and 20° C., and thus was preferred to SR406. Further tests showed that some control of *Botrytis cinerea*, *Penicillium* sp., and *Rhizopus nigricans* was also given. In small-scale practical tests dipping the fruit for a few seconds in 0·7% aminol before storage was satisfactory.

329. BYRDE, R. J. W.
Observations on the sporulation of *Sclerotinia fructigena* on mummified apples and plums in late spring and summer.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 163-6, bibl. 3.

Preliminary observations were made in 1951-53 on the occurrence of outbreaks of sporulation of *Sclerotinia fructigena* on over-wintered mummified apple and plum fruits in April, May and June. Examination of routine meteorological data indicates that moderate rainfall, coupled with relatively high overnight temperatures, induces such outbreaks. [Author's summary.]

330. PETTINARI, C. M.
Prove di lotta contro le sclerotinie dei fruttiferi con anticrittogamici acuprici. **(Tests on the control of *Sclerotinia* spp. in fruit trees with non-copper fungicides.)** [English summary, 6 lines.]
Bol. Staz. Pat. veg. Roma, 1953 (issued 1954), **11**: 243-50, bibl. 6, illus.

In experiments near Rome in 1953 zineb, phygon and SR406 were compared for the control of *Sclerotinia fructigena* on pear and apple and of *S. cinerea* on peach and plum. In the Passe Crassane pear the numbers of diseased fruits were 12, 15 and 16 respectively following the use of these fungicides in the order mentioned compared with 153 in the control. Control was also good in smaller-scale experiments with plum, apple and peach.

331. HUTTON, K. E., AND MORSCHEL, J. R.
Black heart of apricots in N.S.W.
Agric. Gaz. N.S.W., 1954, **65**: 364-7, bibl. 2, illus.

Black heart of apricots, caused by *Verticillium dahliae*, was first observed in the Murrumbidgee Irrigation Area in 1948. It is an economic problem only in young trees 3–6 years old, and occurs where apricots are grown with or after tomatoes. Inoculated tomato seedlings planted near young apricot trees caused infection in 12 months. Control can be obtained to a certain extent by keeping tomato and apricot cultures apart.

332. WRIGHT, W. R., AND SMITH, M. A.
Diplodia fruit rot of peaches.
Phytopathology, 1954, **44**: 471-2, bibl. 1, illus.

The natural occurrence of *Diplodia natalensis* rot on Georgia peaches, first observed in 1950, was observed again in 1951. The rot is not of importance at present.

333. GUBA, E. F.
Large leaf spot and canker of peach caused by the fungus *Fusicoccum amygdali* Delacr.
Plant Dis. Reptr, 1953, **37**: 560-4, bibl. 5.

A description of a disease which infects leaves and twigs of peach trees and is destructive to certain varieties. The canker organism progresses rapidly, killing current and previous season's growth with attendant loss of fruit. Orchards in southeastern Massachusetts are being rehabilitated by fungicidal treatment starting with lime sulphur at delayed dormant stage. Thiocarbamate fungicides, captan, phygon, thiram and lime sulphur all destroy conidia. Protection of the trees with fungicides up to mid-October is necessary. Removal of diseased branches in the dormant season and a clean-up pruning in May–June are important. [See also *H.A.*, 24: 2463.]

334. FISCHER, R.
Die Sprühflecken-Krankheit des Steinobstes, eine neue Krankheit für Österreich. **(*Cylindrosporium* disease of stone fruits in Austria.)**
Pflanzenarzt, 1954, **7** (1): 4-5, from abstr. in *Z. PflKrankh.*, 1954, **61**: 538.

Another note on the first record of *Cylindrosporium* disease (*C. padi*) on cherries and zwetschens in Austria. The development of the leaf-spot symptoms is discussed. [See also *H.A.*, 24: 1348.]

335. TIMS, E. C., MILLS, P. J., AND EXNER, B.
Thread-blight (*Pellicularia koleroga*) in Louisiana.
Plant Dis. Reptr, 1954, **38**: 634-7, bibl. 20.

After discussing the history and name of the fungus the authors list some 40 host plants including many fruit species, and detail attempts at control on fig and tung. On fig copper sulphate-lime-arsenite spraying during the dormant season has achieved good control. Two applications of bordeaux have greatly reduced the amount of thread blight. Two applications of tribasic copper sulphate in early summer have given satisfactory control. On tung bordeaux spraying combined with pruning proved useful.—La agric. Exp. Stat., Baton Rouge.

336. BIRAGHI, A.
Ulteriori notizie sulla resistenza di *Castanea sativa* Mill. nei confronti di *Endothia parasitica* (Murr.) And. **(Further notes on resistance to *Endothia parasitica* in *Castanea sativa*.)** [English summary, 10 lines.]
Bol. Staz. Pat. veg. Roma, 1953 (issued 1954), **11**: 149-57, bibl. 10, illus.

Cases of resistance to the blight fungus have been observed in sweet chestnuts in various parts of Italy, generally in plantations where infection is of long standing. The resistance is due to increased cambial activity which permits the stoppage of penetration and the elimination of the disease. Similar histological changes occur in the more resistant *C. mollissima* and *C. crenata* when inoculated with the parasite.

337. JACKS, H., AND BROOK, P. J.
Control of fabraea-scald of quinces.
Orchard. N.Z., 1954, **27**: 3-5, illus.

Captan and thiram gave satisfactory control of fabraea-scald of quince (*Fabraea maculata*), when applied after bud movement had started. Colloidal copper and copper oxychloride also controlled the disease, but caused skin damage to the fruits.

338. CORKE, A. T. K.
Blackcurrant leaf spot: I. Studies of perennation and infection.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 154-8, bibl. 2.

The presence of the perfect stage of *Pseudopeziza ribis* Kleb. on the dead leaves of blackcurrant bushes at Long Ashton was confirmed during the winter of 1952–53. Laboratory infections with ascospores and conida showed that individual lesions had a very limited effect on the leaves. The damage done in the field was attributed to the mass infections that occurred following summer rain-storms. Primary infections in the field were observed mainly in May on the leaves surrounding the fruit clusters. The removal in February of the dead leaves from the ground around the bushes was found to reduce the incidence of leaf spot significantly, an effect which persisted throughout the summer. This result was obtained to a smaller degree by the application of 0·1% dinitro-*ortho*-cresol as a ground spray during the dormant period, and also by the routine applications of 1½% lime sulphur in early April near the time of primary infection. [Author's summary.]

339. PELLETIER, E. N., AND HILBORN, M. T.
Blossom and twig blight of low-bush blueberries.
Bull. Me agric. Exp. Stat., **529**, 1954, pp. 27, bibl. 38.

Twig and blossom blight of blueberries caused by *Botrytis cinerea* is sometimes very destructive in Maine. Laboratory experiments have shown that the temperature growth range of the fungus is between 5 and 32° C., with an optimum at 23° C. The fungus will infect all stages of floral bud development after 9 days incubation period, 3 to 4 days incubation being necessary for flower infection. Clonal susceptibility varies. In the field it was shown that there was a higher percentage of infection on plants grown with a peat mulch than with a sawdust mulch; more infection was found among plants fertilized early than late, and among those receiving more complete fertilizers. In laboratory tests with fungicides and antibiotics the elemental S compounds were the least effective and the organic mercury compounds and dithiocarbamates the most effective for control. Fungicidal assays in the greenhouse showed that the dithiocarbamates gave the best and the elemental S compounds the least control. Some organic mercurials, Crag 341, and some copper materials were toxic to blueberry leaves. Field trials in 1952 and 1953 tended to substantiate laboratory and greenhouse tests. [See also *H.A.* 24: 302 and 2459.]

340. RIJKSTUINBOUWCONSULENTSCHAP GOES.
Botrytis bestrijding bij aardbeien en frambozen. (***Botrytis* control on strawberries and raspberries.**)
Fruitteelt, 1954, **44**: 881-2.

Small-scale trials on commercial plantations were made in Zeeland in 1954 on the control of *Botrytis* in strawberries and raspberries. The critical time for spraying with TMTD was between 10 and 30 May, and spraying after this period gave little control. On Mme Moutot 0·4% TMTD gave better control than 0·5% captan, but captan had a favourable effect on leaf growth and fruit size. Trials on Malling Promise showed that satisfactory control could be obtained by a fairly late application of TMTD.

341. POWELL, D.
The effect of captan on gray mold rot incidence and yield of strawberry.
Plant Dis. Reptr, 1954, **38**: 209-11, bibl.2, and *Trans. Ill. St. hort. Soc. for 1953*, 1954, **87**: 197-200.

Five applications of 50% captan at 6–10-day intervals starting on the appearance of the first bloom resulted in a 75% decrease in grey mould (*Botrytis cinerea*) infection in flowers and fruit, a great increase in production and size of fruit and a delay in the development of post-harvest rot.—Dep. Hort. Div. Plant Path. Univ. Ill., Urbana.

342. WILHELM, S.
Verticillium wilt resistance in strawberry.
From abstr. in *Phytopathology*, 1954, **44**: 510.

California selections of *Fragaria chiloensis* were immune; *F. verginiana* and *F. vesca* were susceptible. Verticillium-immune plants generally have thick, glossy, dark green leaves suggestive of derivation from *F. chiloensis*, and 95% are also resistant to powdery mildew of the foliage. [From author's abstract.]

343. WILHELM, S., AND NELSON, P. E.
Two new fungus root parasites of strawberry.
From abstr. in *Phytopathology*, 1954, **44**: 510.

Two fungi, apparently hitherto unknown, have been isolated repeatedly from diseased strawberry roots and their pathogenicity to strawberry established in controlled greenhouse inoculations. These fungi are thought to account for much of the strawberry root deterioration in soils where the black root disease occurs. One is a species of *Pyrenochaeta* and the other resembles *Ramularia*.

344. STELLWAAG, F.
Beitrag zur Botrytisbekämpfung. (***Botrytis* control [on vine].**)
Rhein. Weinztg, 1953, **8**: 151-3, from abstract in *Z. PflKrankh.*, 1954, **61**: 414.

Sixty-three chemicals were tested in the laboratory against grey mould of vine. Compounds with a fungistatic, not fungicidal, action are recommended for use during the ripening period.

345. TAYLOR, R. H.
Black spot of the vine.
J. Dep. Agric. Vict., 1954, **52**: 370-4, illus.

Black spot of vine [*Elsinoe ampelina*] was successfully controlled on sultana canes by spray schedules using dithiocarbamates. Thiram or ziram were applied at 1½ lb. of 80% dispersible powder in 100 gal. water, the first application at bud burst being followed by 3 further sprays at fortnightly intervals. Zineb also gave promising control but further tests are needed. The mercurial sprays used gave no promise of being useful for control of black spot. Ziram is recommended for use in zinc deficient orchards.

346. Emiliani, G.

Sperimentazione antiperonosporica con preparati organici sintetici e minerali per l'annata 1953. **(Experiments in the control of vine downy mildew with synthetic and mineral organic preparations in 1953.)**

Bol. Staz. Pat. veg. Roma, 1953 (issued 1954), **11**: 220-41, bibl. 8.

A summary is given of past experiments [see *H.A.*, 22: 2369, *H.A.*, 22: 3625 and *H.A.*, 24: 1360]. The objects of the 1953 experiments here described were (1) to compare the fungicides used in the past with neutralized bordeaux mixture, (2) to compare the non-copper thiocarbamates with low-copper (tonic not fungicidal) thiocarbamates, and (3) to give further study to two non-copper products, namely, dithane (zinc ethylene bisdithiocarbamate) and SR. 406 (N-trichloromethylthiotetrahydrophthalimide). Fifteen fungicides including carbamates with and without copper, phthalimides, copper oxychloride and bordeaux mixture were applied 11 times between 9 May and 9 September inclusive to Montepulciano vines. Detailed results are given. In general, dithane and SR. 406 were equal to 1% bordeaux in immediate fungicidal effect but not in residual effect or in control of defoliation. Control recommendations are the use of a non-copper fungicide with traces of copper added for growth stimulation, and the application of at least one extra treatment in the early autumn.

347. Blumer, S., and Kundert, J.

Die Eignung von Kupfer und organischen Präparaten für die Bekämpfung der Peronospora im Weinbau. **(The use of copper and organic compounds for downy mildew control on vine.)** [French summary, ¾ p.]

Landw. Jb. Schweiz, 1954, **68**: 267-89, bibl. 37, illus.

The action of organic (Zineb, captan) and copper compounds on vine diseases and on the vines themselves is discussed. In preliminary laboratory and field tests at Wädenswil and Lausanne the addition of copper (carbonate of copper or copper oxychloride) to zineb or captan was found to be promising, the mixture with its synergistic action apparently retaining the merits of both types of fungicide while avoiding their disadvantages. It seems that in this manner effective control of downy mildew may be combined with some protection against oidium and *Botrytis* without appreciable injury to the plants.

348. Henniger, H.

Untersuchungen zur Entwicklung und Variabilität von *Pseudopeziza tracheiphila* Müller-Thurgau. **(Studies on the development and variability of *Pseudopeziza tracheiphila*.)**

Phytopath. Z., 1954, **22**: 1-34, bibl. 20, illus.

The variability of the fungus is discussed in relation to the breeding of resistant vine varieties.

349. Harvey, J. M.

Forecasting decay in stored California table grapes.

From abstr. in *Phytopathology*, 1954, **44**: 492.

California table grapes are held in cold storage for as long as 6 months before marketing. Decay in experimental lots of stored grapes of the Emperor variety has been successfully forecast for the last 2 years by use of a method based on the measurement of incipient infections in grapes at harvest. [From author's abstract.]

Nematodes.

(*See also* 413b.)

350. Minz, G.

Plant parasitic nematodes. [Hebrew, English summary, pp. 2.]

[*Publ.*] *agric. Res. Stat., Rehovot*, 1953, pp. 40, bibl. 40, illus.

Root-knot nematodes, *Meloidogyne* spp., are considered to be the only important nematode pests in Israel. A list is given of more than 200 plant species which may become infested. Control is complicated by the coincidence of the most favourable environmental conditions for both crop and pest during the summer. Nematode attack is particularly heavy on light and medium soils. Infested vines and trees grafted on bitter almond stock may die within a few years. The main sources of infestation are transplants and seed potatoes. The leaf nematode, *Aphelenchoides* sp., has also been found on dahlia and salvia.

351. Feder, W. A.

Laboratory evaluation of certain nematocidal materials.

Phytopathology, 1954, **44**: 428-30, bibl. 12.

A laboratory technique for assaying nematotoxicity of vapours of organic phosphate insecticides against foliar nematodes is described. The test nematodes were *Aphelenchoides besseyi* and *Ditylenchus dipsaci*.—Cornell Univ., U.S.D.A. Ornam. Res. Lab., Farmingdale, N.Y.

352. Swart-Füchbauer, H.

Beobachtungen zum Problem der Bodenmüdigkeit in den Baumschulen. **(Observations on soil sickness in nurseries.)**

Zeitfragen der Baumschule, **11**, Verlag Deutsche Gärtnerbörse, Aachen, 1954, pp. 16, illus.

At the request of nurserymen in the Rhineland an investigation into the problem of soil sickness was initiated at the Plant Pathology Institute, Bonn. The author gives an account of his studies which led him to reject current theories on possible causes of the trouble and to suggest that soil sickness may be largely due to ectoparasitic nematodes. [See also next abstract.]

353. Swart-Füchbauer, H.

Ektoparasitische Nematoden als mögliche Ursache der Bodenmüdigkeit in Baumschulen. **(Ectoparasitic nematodes as a possible cause of soil sickness in nurseries.)**

Reprinted from *Naturwissenschaften*, 1954, **41**: 148-9, bibl. 7, illus.

In extensive field and laboratory studies depletion of minor elements, toxic secretion by roots and changes in the composition of the microbial soil flora were ruled out as possible causes of soil sickness at Bonn. The improvement in tree growth that followed soil sterilization by chemicals or heat suggested that the trouble must be due to some pathogenic organism and a close examination of apple, quince and mountain ash roots revealed the presence of ectoparasitic nematode larvae of the genus *Anguillulina* (*Tylenchus*). Their heads were found penetrating into the peripheral parenchyma of the root, causing some necrosis. The symptoms of soil sickness, such as the swelling of root tips, the underdevelopment of lateral roots and the greater freedom from injury in more vigorously growing plants, are thought to point to nematodes as the cause of the trouble. This view is supported by counts of 50–100 nematodes on 1 cm.-long root tips from sick soil, as compared with almost complete absence of nematodes on roots growing in virgin soil. A detailed account of the work will be given elsewhere.—Bonn Univ.

354. Bosher, J. E.
Root-lesion nematodes associated with root decline of small fruits and other crops in British Columbia.
Canad. J. agric. Sci., 1954, **34**: 429-31, bibl. 8.

Nematode species of the genera *Pratylenchus*, *Paratylenchus*, *Xiphinema*, *Criconemoides*, and *Criconema* are associated with decaying roots of strawberry, loganberry and raspberry plants in certain plantations in British Columbia, and are an important factor in declining yields. [From author's abstract.]

355. Horn, N. L., and Martin, W. J.
Plant parasitic nematodes in relation to strawberry culture in Louisiana.
From abstr. in *Phytopathology*, 1954, **44**: 493.

A preliminary survey of the nematode population in strawberry soils of Louisiana indicated the common occurrence of large populations of nematodes. Experiments showed that several species propagated readily on roots of the Klonmore variety growing in steam-sterilized soil, but that severe root damage resulted from *M. hapla* only. Soil fumigation experiments with ethylene dibromide in commercial fields of the Klonmore variety resulted in increased growth and yields in soils infested with *M. hapla*. Although increased growth appeared evident in one test where the soil was heavily infested with *T. claytoni*, no response in yield was obtained as a result of the fumigation. Populations of all parasitic species were reduced greatly in the fumigated plots and remained at low levels during the entire production period.

356. Lindhardt, K., and Thuesen, A.
Forsøg med varmtvandsbehandling af jordbaerplanter med henblik på bekaempelse af jordbaerål (*Aphelenchoides* spp.). **(Experiments on hot-water treatment of strawberry runners for eelworm control.)** [English summary, p. 1¼.]
Tidsskr. Planteavl. 1954, **58**: 149-68, bibl. 7, illus.

Experiments with the strawberry variety J.A. Dybdahl, the variety most commonly grown in Denmark, confirmed that Staniland's method of hot-water treatment [*H.A.*, 23: 4022] gives satisfactory control of *Aphelenchoides ritzema-bosi* and *A. fragariae*. The best results were obtained with a 10-minute treatment at 46·2–46·5° C., a lower temperature being less effective and a higher temperature being liable to cause severe damage to the plants. Small runner plants not yet rooted proved more susceptible to injury than older ones. In view of its exacting nature the treatment is recommended chiefly for building up stocks of healthy strawberries for propagation. Other varieties are to be included in further studies.—Spangsbjerg.

357. Thuesen, A.
Dyrkningsforsøg med kloner af jordbaer 1948–53. **(Trials with strawberry clones 1948–53.)** [English summary, ½ p.]
Tidsskr. Planteavl, 1954, **58**: 169-76.

Great differences in yield between strains were noted in comparative trials with 9 clones of the strawberry variety J.A. Dybdahl, carried out at the 4 Danish State Horticultural Research Stations. While it was not possible to identify any of the strains by vegetative or fruit characters, a correlation existed between yields and the degree of eelworm infestation. These findings may be explained by one of two possible assumptions: either there are differences in eelworm resistance between clones, or strawberry eelworms do not spread in the field from plant to plant but are spread only by propagation from infested mother plants. The second explanation emphasizes the necessity of obtaining healthy mother plants by hot-water treatment.

Mites.

358. Mühlmann, H.
Beobachtungen an Spinnmilben im Weinbau. **(Observations on spider mites of vines.)**
Mitt. biol. Bundesanst. Berlin-Dahlem, 1954, Heft 80, pp. 121-5, bibl. 2, illus.

The author's observations show that in Germany *Tetranychus urticae* is a more serious pest of vines than *Paratetranychus pilosus*. Chemical control is discussed, but early eradication of weeds in and around vineyards may be an alternative method of keeping down *T. urticae* infestations.—Landes-Lehr-u. Versuchsanst, f. Wein-u. Obstbau, Oppenheim a. Rh.

359. Mathys, G.
Le problème de la lutte contre les araignées rouges de la vigne. **(The problem of red spider control on vines.)**
Rev. romande Agric. Vitic., 1954, **10**: 81-4, illus.

Studies have been made over several years on the occurrence of red spider mites on vines in French-speaking Switzerland. The most widespread species is *Metatetranychus ulmi*, but 2 others occur very occasionally. The most susceptible period for chemical control is when the young vine shoots are about 4–5 cm. long. The mite is attacked by an active predator, *Typhlodromus*, which feeds on both egg and post-embryonic stages, and can also feed on plant sap. The 3 vine varieties on which the predator does not occur to any great extent are Riesling, Johannisberg and P.D. Seyve-Villard 5–247, and in practice these suffer the most from red spider. Trials with 3 P.D. varieties, Seyve-Villard 5–247, Seibel 7–53, and Seibel 1000, showed that systox was superior to diazinon and parathion for mite control. Diazinon and G.338, however, were less destructive of the predator than systox and parathion.

Insect pests.

(*See also* 246, 247, 284, 413y, 414f, 944.)

360. Ministry of Agriculture, London.
Report on insect pests of crops in England and Wales, 1938–1943.
Tech. Bull. Minist. Agric. Lond., **5,** 1954, pp. 91, 3s. 6d.

Including those on vegetables in field and glasshouse, mushrooms, fruit, flower crops and hops.

361. Pschorn-Walcher, H.
Bemerkenswerte mitteleuropäische Schädlingsauftreten in klimatischer Sicht. **(Remarkable incidence of pests in Central Europe in relation to a change of climate.)** [English summary, ½p.]
Z. PflKrankh., 1954, **61**: 521-33, bibl. 31.

Since about 1920, but especially since 1940, the climate of Central Europe has become increasingly continental with colder winters and warmer, drier growing seasons. This climatic change has been accompanied by the incidence of new thermophilic and xerothermophilic insect pests, the economic importance of which has hitherto been confined to southern and south-eastern Europe respectively. *Ceuthorrhynchus napi*, *Tropinota hirta* and *Acanthoscelides obsoletus* are among the pests discussed.—Europ. Lab. Commonw. Inst. biol. Control, Zürich.

362. Bennett, S. H.
Spray application problems: VIII. The control of apple and plum aphides by DDT and BHC spring washes,
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 129-34, bibl. 2.

A satisfactory control of apple aphides (*Aphis pomi* and *Sappaphis plantaginea*) was obtained with BHC at 0·013–0·014% gamma isomer applied as an emulsion at early bud burst and at early to mid-green cluster stages, and as wettable powder applied at the late pink bud blossom stage. BHC at 0·007% gamma isomer and DDT at 0·025% were both effective at the early green cluster stage. BHC at 0·013%–0·014% gamma isomer both as emulsion and wettable powder, tar oil at 3·5% and 0·5%, and DDT at 0·05% as an emulsion have given efficient control of leaf-curling plum aphid (*Brachycaudus helichrysi*) when applied in January, February or March. [Author's summary.]

363. Bebić, N.
Prilog poznavanju biologije rutave bube. **(Contribution to the knowledge of the biology of *Tropinota hirta*.)** [English summary, ¾ p.]
Zasht. Bilja, 1954, No. 23, pp. 63-71, bibl.6.

Adults of *T. hirta* emerge from the soil in early spring, feed at first on wild flowers and then on blossoms of cultivated plants. A list of 37 host plants is given which includes the most important pome-, stone- and small-fruits, vines, some vegetables and flowers. In laboratory trials low concentrations of 2 organo-phosphorous compounds and a DDT preparation were found to be very effective against the beetle, but they also killed bees which are most active at the time the control treatments should be applied.

364. Trouvelot, B., Arnoux, J., and Martouret, D.
Quatre années de recherches sur les ennemis du pommier à cidre en Normandie. **(Four years' research on the pests of cider apple trees in Normandy.)**
C.R. Acad. Agric. Fr., 1954, **40**: 471-4, bibl. 9.

One of the conclusions drawn from the entomological investigations described is that *Anthonomus* is generally a useful thinner of flower buds and is only rarely injurious.

365. Hanspeter, A.
Ein neuer Obstbaumschädling in Tirol. **(A new top fruit pest in the Tyrol.)**
Pflanzenarzt, 1954, **7** (9): 1, from abstr. in *Z. PflKrankh.*, 1954, **61**: 541.

The damage caused by *Chlorocystis rectangulata* to apple flower buds and fruits is similar to that resulting from attacks by *Anthonomus pomorum*. Pears were also injured in the Tyrol by this new pest.

366. Chrestian, P., and Guessous, A. [Editors.]
Le capnode noir des arbres fruitiers (*Capnodis tenebrionis* L., Coléoptères *Buprestidae*). **(The black capnodis beetle of fruit trees.)**
Mém. Serv. Déf. Vég. Rabat, **63,** undated [received 1954], pp. 15, illus.

The life-history of the capnodis beetle is given. The adult feeds on the leaves of stone fruit trees, causing little damage in the orchard, although it may be more serious in the nursery. The larvae burrow into the roots, the first visible signs of their presence in the tree being shown by leaf wilting, followed by yellowing and gradual decline. Cultural control methods include choice of healthy propagating material, removal of infected trees and other rosaceous hosts, and the use of bitter almond as a resistant rootstock. Control of the adults may be obtained by hand collection, spraying with dieldrin, or dusting with BHC, these treatments being started at the end of May in Morocco, before egg-laying starts. Larval control may be obtained by soil watering or dusting with dieldrin or BHC, starting during the first week after egg-laying.

367. Louw, B. K.
The control of, and the effect of insecticides on the larvae of the spotted maize beetle.
Fmg. S. Africa, 1954, **29**: 281-5, illus.

The life-history of the spotted maize beetle, *Astylus atromaculatus*, is described. Severe attacks by the larvae on ripe strawberry fruits have been reported. Dieldrin applied in solution to individual plants gave very good control, acting as a stomach and contact poison. Dieldrin powder may also be applied to the soil before planting.

368. Ibbotson, A., and Edwards, C. A. T.
The biology and control of *Otiorrhynchus clavipes* Bonsd. (Rhyn. Coleop.), a pest of strawberries.
Ann. appl. Biol., 1954, **41**: 520-35, bibl. 7, illus.

Otiorrhynchus clavipes, which is usually considered a pest of top and bush fruit, is a serious pest of strawberries around Cheddar, Somerset. The biology of the weevils is described. The larvae eat the feeding roots of the current season and their damage has been largely responsible for restricting the effective life of strawberry beds to at most 2 years. Adult weevils attack the foliage but the damage is unimportant. Although weevil attack can be avoided by growing the crop in a 1-year rotation, control is difficult owing to the intensive cropping, which creates the most suitable conditions for the spread of the infestations. The adults are killed by 10% DDT dust, and the larvae by DDT or BHC preparations poured onto the soil at the rate of 1 pint per plant, or by DD injection. The limitations and possibilities of various methods of control are discussed.—N.A.A.S. Westbury-on-Trym, Bristol.

369. PERRET, J.
Remarques concernant la lutte contre l'altise de la vigne. (**Notes on the control of the vine flea beetle.**)
Terre maroc., 1954, **28**: 247.

The vine flea beetle is active until November in North Africa, especially in the Atlantic coastal districts. One or 2 generations develop after the harvest and these provide most of the over-wintering population. At least one standard post-harvest treatment with an insecticide having a long residual effect is recommended.

370. ASQUITH, D.
The periodical cicada in southern Pennsylvania in 1953.
J. econ. Ent., 1954, **47**: 457-9, bibl. 5.

Young fruit trees, particularly apple, peach and pear, were heavily infested with periodical cicada, *Magicicada septendecim*, emerging from old orchard soils. In control tests, 1- to 3-year-old apple trees were most easily protected with coverings of netting unless situated in bearing orchards sprayed with TEPP. Apple trees 4 to 10 years old, if subject to reinfestation from outside sources, required at least 5 sprays of TEPP. In bearing apple orchards, cicadas were controlled by spraying with TEPP (40%), at 6 oz. per 100 gal. in dilute sprays, and 1 pt. per 100 gal. in concentrated sprays. The number of applications needed to protect an orchard depended on the degree of reinfestation from woodland. Spraying of both orchard and woodland from aeroplanes was also tried with success.

371. DEAN, R. W.
Further studies of insecticides for apple maggot control.
J. econ. Ent., 1954, **47**: 479-85, bibl. 2.

The toxicity of 14 materials to apple maggot, *Rhagoletis pomonella*, was evaluated in laboratory and field trials in New York. In the orchard tests, wettable powder formulations of Q-137 (Perthane), at 1 lb. of actual toxicant in 100 gals. reduced heavy infestations to low levels when applied 4 to 6 times during the season. Methoxychlor at 1 lb. per 100 gals. gave only fair control in one test but was very effective under more favourable conditions: CS-708 (Dilan) gave good control at 4 lb. of a 25% w.p., in 100 gal.

372. TOMINIĆ, A.
Ispitivanja muhe trešnjarice u Dalmaciji. (**Investigations on the cherry fruit fly in Dalmatia.**) [English summary, 2 pp.]
Zasht. Bilja, 1954, No. 23, pp. 44-62, bibl. 9, illus.

An account is given of the life history, habits and attempts to control the cherry fruit fly, *Rhagoletis cerasi*, infesting cherries, particularly the valuable marasca type, *Cerasus marasca*. In laboratory experiments, organo-phosphorous compounds had a very good initial but unsatisfactory residual effect, while the slower acting DDT preparations gave a longer residual action. In field trials, the DDT preparation Gesarol NL applied with a mist sprayer gave the best control.

373. DELMAS, H.-G.
Essai de lutte chimique contre "*Ceratitis capitata*" Wied. (**Chemical control tests on *Ceratitis capitata*.**)
Progr. agric. vitic., 1954, **142**: 218-26.

In Southern France 2 comparative tests were made using DDT and dieldrin in the control of Mediterranean fruit fly on peaches. A local peach variety was used in the first test, and both DDT and dieldrin emulsions gave good protection to the fruits. Dieldrin had no apparent phytotoxic effect. In the second test, on J. H. Hale peaches, emulsions of DDT and dieldrin were used at 2 concentrations. DDT emulsion at both 0·25% and 0·125% active ingredient gave satisfactory persistent control: dieldrin emulsion at 0·25% active ingredient gave rather less satisfactory control, which was, however, better than that given by the 0·5% concentration. In addition DDT gave good control of the oriental fruit moth, *Laspeyresia molesta*. In this test DDT oil emulsion gave a red colour to the fruits without affecting the flavour: dieldrin emulsion, however, was strongly phytotoxic, causing fruit deformation and delaying maturity. It is concluded that the most efficient control of the fruit fly may be obtained by using DDT as an oil emulsion at 125 gm./hl. of active ingredient, in 2 treatments at 10-day intervals, the first being given 20 days before harvest. [See also *H.A.*, 23: 4049.]

374. HUTCHINSON, M. T.
Control of the cranberry fruitworm on blueberries.
J. econ. Ent., 1954, **47**: 518-20, bibl. 7.

Ten insecticides were tested against the cranberry fruitworm, *Mineola vaccinii* Riley, in a heavily infested blueberry field at Lower Bank, N.J. Malathion, methoxychlor, endrin and parathion gave outstanding control. Treated berries were subjected to residue analyses and flavour evaluation. [Author's summary.] [See also *H.A.*, 24: 2510.]

375. KING, D. R.
Control of *Acrobasis caryae* and *Tetranychus hicoriae* on pecans.
J. econ. Ent., 1954, **47**: 713-15, bibl. 5.

In experiments in Texas DDT and methoxychlor at 1·5 lb. each, and parathion and EPN at 0·25 lb. each per 100 gal. were about equally effective in controlling the pecan nut casebearer, *A. caryae*. A pecan mite, *T. hicoriae*, infestation, which developed following

DDT treatments, was satisfactorily suppressed for 3 weeks by 0·25 lb. of parathion and 6 lb. of sulphur in 100 gal.

376. Michelbacher, A. E., and Oatman, E.
Codling moth at Linden in 1953.
Calif. Agric., 1954, **8** (8): 12-13.

Payne walnut trees were sprayed just before the first brood caterpillars of codling moth began to enter the nuts. The sprays were applied by conventional sprayer or by an air carrier sprayer. Application of approximately 8 lb. of 50% wettable DDT per acre was found to give effective control.

377. Bennett, S. H.
Spray application problems: IX. Observations on the time of application and influence of site of deposition of BHC on the control of apple sawfly (*Hoplocampa testudinea* Klug.)
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 135-8.

The influence of the site of placement of BHC on developing fruitlets on the control of apple sawfly larvae immediately after emergence is discussed. Good control was obtained without complete coverage of the fruitlet. When the application of BHC was delayed until after the commencement of egg hatch, only flooding of the calyx cup or complete wetting of the truss gave efficient control. BHC applied at late pink bud blossom stage to control adult sawflies gave promising results in 1953.—[Author's summary.]

378. Pieri, G.
L'*Eulecanium persicae* Fabr. dannoso alle viti in Friuli. **(Damage by *Eulecanium persicae* to vines in Friuli.)**
Riv. Vitic. Enol., 1954, **7**: 237.

Eulecanium persicae was observed in large numbers on vines in parts of Friuli in 1954. Normally the scale is effectively controlled by its parasites and predators but when present in large numbers it can cause damage by the withdrawal of sap and the production of honeydew. Dormant spraying with 4–5% mineral oil emulsion is recommended for control.

379. European Plant Protection Organisation.
***Aspidiotus perniciosus* Comst. San José scale. Europe—1953.** [English and French.]
[*Publ.*] *Eur. Plant Prot. Org.*, 1954, pp. 12 and XI.

The position with regard to the San José scale in different European countries is outlined. Control methods with examples of local preferences are given.

380. Gallay, R., and Mathys, G.
La lutte contre le pou de San-José. **(Control of San José scale.)**
Rev. romande Agric. Vitic., 1954, **10**: 74-6, illus.

Government measures for the control of San José scale (*Aspidiotus perniciosus*) brought into force in 1948 have resulted in the complete elimination of the pest except in Valais and Tessin where the tree infestation rates are estimated to be 1 and 3% respectively. It is considered that the control measures designed to effect complete eradication should continue despite the work and expense involved.

381. Doutt, R. L.
Biological control of fig scale.
Calif. Agric., 1954, **8** (8): 13, illus.

An *Aphytis* species resembling *mytilaspidus* was released among fig scales, *Lepidosaphes ficus*. Observations showed that only the overwintering population of scales was attacked by the parasite, and the greatest activity was on scales on the twigs. Samples of scales collected 4 or 5 years after *Aphytis* releases showed parasitism ranging from 67% to 100%.

Rodent pests.

(*See also* 413e, f, 414d. 525.)

382. van Wijngaarden, A.
Biologie en bestrijding van de woelrat, *Arvicola terrestris terrestris* (L), in Nederland. **(The biology and control of the water vole in the Netherlands.)** [English summary, 3 pp.]
Meded. PlZiekt. Dienst, **123**, 1954, pp. 147, bibl. 143, illus.

In the Netherlands serious damage can be caused by this rodent, in particular to fruit tree roots and bulbs. A large increase in vole population has resulted from improved drainage systems, where the vertical banks covered in vegetation and the constant water level afford an ideal habitat. A list is given of crops known to have been damaged by water voles. Methods of control are discussed, but prevention is preferred to extermination, as the high birth rate means quick reoccupation of cleared areas.

383. Giban, J.
Le campagnol terrestre et le campagnol souterrain, deux ravageurs des vergers. **(Field voles as pests of orchards.)**
Arboric. fruit., 1954, Nos. 6-7, pp. 9-12, illus.

Damage caused by, and identification and control of 2 vole species, *Arvicola terrestris* and *Pitymys subterraneus*, are described. These pests eat the root systems of most fruit trees, but there is some indication of varietal preference in apples. Methods of control outlined include gas, poison, baits and traps. A method of trapping voles developed at the Vertebral Laboratory at Versailles is also described. A small trench is dug near known vole holes, and baited, although not with poison; after 2-5 days, when the bait has been eaten, poisoned bait is substituted and a trap placed across the vole's entrance to the trench.

384. Mathlein, R.
Sorkplågan—Bekämpningsförsök år 1953. **(The vole plague. Trials on its control in 1953.)**
Växtskyddsnotiser, 1954, No. 1, pp. 1-5, illus.
Herrstrom, G.
Iakttagelser vid bekämpning av åkersork i frukt- och barodling. **(Observations on the control of voles in top and small fruit plantings.)**
Ibidem, 1954, No. 1, pp. 5-6.

In trials on vole control warfarin gave very satisfactory results if the bait was maize. The second article describes the adaptation of the bait-laying method to fruit plantings where vole infestation was so severe that individual holes could no longer be dealt with.

385. GIBAN, J.
Test d'efficacité pratique d'un raticide. (Test of the practical efficiency of a rat poison.)
Ann. Épiphyt., 1954, **5**: 79-85, bibl. 14.

A method of estimating the efficiency of rat poisons is fully described. The method is based on a population count before and after treatment based on the amount of bait eaten daily.

Other hostile bodies.

386. HOBBIS, E. W., AND MARSH, R. W.
The infection of apple stems through wounds caused by geese.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 89-90, illus.

A case is recorded in which geese grazing a young commercial apple orchard damaged a high proportion of the stems within a few days. Cankers subsequently developed due to invasion by a fungus tentatively identified as *Gloeosporium perennans*, and about 50% of the trees were rendered useless. The wounds caused by geese in a check plot at Long Ashton are illustrated.

387. FREAR, D. E. H., WHITE, D. G., AND SHARP, W. M.
Deer damage and its control.
Science for the Farmer, 1954, **2** (1): 5, illus.

Tests in Pennsylvania and other states during the past 2 years have shown that sprays containing bone tar oil will repel deer from apple trees, nursery stock and other crops. Applications have proved effective for approximately 1 month under average conditions. The spray does not appear to repel rabbits, but there are indications that it may repel other small animal pests such as beavers and woodchucks. [See also *H.A.*, 23: 2918.]

Antibiotics.

(*See also* 308–312, 315, 413i, s, 593, 612, 676, 721, 727, 790.)

388. DUNEGAN, J. C.
Antibiotics in plant disease control.
J. agric. Food Chem., 1954, **2**: 1020-2.

The author reviews recent results obtained in the U.S.A. with antibiotics in the control of plant diseases. Streptomycin alone or with terramycin has drastically reduced blight infections on apples and pears; halo blight of beans, bacterial spot of pepper and tobacco blue mould have also been successfully controlled by these 2 compounds. Acti-dione is a fungicidal antibiotic for use against turf diseases, mint rust, and cherry leaf spot. The mode of action of antibiotics is that of systemic therapeutants: their persistance varies in use against different disease organisms. Their use is not as yet commercially economic.

389. THOMAS, H. R.
Effects of antibiotics on health and growth of plants.
Proc. Soil Sci. Soc. Fla, 1953, 1954, **73**: 17-25, bibl. 61, illus.

Recent developments are discussed under the headings Seed treatment, Protectants, Systemics and Growth stimulation.

390. GERON, A.
L'impiego di germicidi (antibiotici e sulfamidici) nella conservazione per refrigerazione dell'uva. (The use of germicides (antibiotics and sulphamides) in the cold storage of grapes.)
Indust. Cons., 1954, **1**: 32, from note in *Riv. Vitic. Enol.*, 1954, **7**: 204-5.

Almost all the compounds tested were efficacious in limiting the development of fungal diseases and some, such as penicillin, improved the flavour of the stored product. Treatment was more efficacious in Uva d'Oro than in Garganega which has inferior storage qualities. Healthy, slightly underripe bunches withstood a 3-month storage period best. It was found necessary to discard before storage all grapes that were shrivelled, over-mature, shade-grown or too watery. Notes are given on the performance of penicillin, streptomycin, vitamin K, deazoline and phthalyl-sulphacetamide.

391. ATKINSON, N.
Psalliotin, the antibiotic of *Psalliota xanthoderma*.
Nature, 1954, **174**: 598, bibl. 2.

Although the antibiotic activity of the edible mushroom *Psalliota xanthoderma* has already been described, the peculiar lability of the active substance has defeated attempts to concentrate and purify it. Work on purification using paper chromatography has shown that the main destructive agent for the antibiotic in crude extracts is bright light. Success can only be achieved by continually protecting it from this. Earlier work must therefore be repeated using suitable lighting. Because of its light sensitivity in crude extracts, the antibiotic appears to be new and unique. It is considered that it may therefore justifiably and conveniently be given the new name psalliotin.—Univ. Adelaide.

Fungicides.

(*See also* 413v, 414m.)

392. POWELL, D.
An evaluation of copper 8-quinolinolate as a fungicide against some pome fruit diseases.
Plant Dis. Reptr, 1954, **38**: 76-9, bibl. 7.

Notes on the successful use of Bioquin 1 to control a number of fungus diseases of pear and apple. At the concentrations necessary it was not phytotoxic. It was not successful against the bacterial disease, fire blight. —Div. Plant Path., Dep. Hort., Univ. Ill., Urbana.

393. OYER, E. B., AND GRIES, G. A.
The fungicidal value of several volatile chlorinated hydrocarbons.
From abstr. in *Phytopathology*, 1954, **44**: 501-2.

The vapours of chlorinated hydrocarbons have been found to reduce development of brown rot of peaches and *Rhizopus* leak of strawberries. Chlorinated ethanes and ethylenes were among the most effective and caused little or no damage to the hosts. [From authors' abstract.]

394. MILLER, P. R. (RICH, S., AND HORSFALL, J. G.)
Thiuram polysulfides as field fungicides.
Agric. Chemls, 1954, **9** (9): 77-8.

Fields tests were conducted at the Connecticut Agricultural Experiment Station in 1953 to test the effectiveness of a series of thiuram polysulphides as protectants against foliage diseases. They were tested for control of apple scab (*Venturia inaequalis*), tomato blight (*Alternaria solani*) and antirrhinum rust (*Puccinia antirrhini*). None of the thiuram polysulphides was so effective as the standard fungicides, phygon and orthocide, for apple scab control. For control of tomato blight, ethylenebisthiuram trisulphide and tetramethylthiuram tetrasulphide were as effective as dithane and orthocide. For control of antirrhinum rust, ethylenebisthiuram tetrasulphide at a 2% concentration was as good as dithane.

395. REAVILL, M. J.
Effect of certain chloronitrobenzenes on germination, growth and sporulation of some fungi.
Ann. appl. Biol., 1954, **41**: 448-60, bibl. 10, illus.

When grown in an atmosphere saturated with tetrachloronitrobenzene (TCNB) vapour, *Botrytis cinerea* showed retarded germination and colony growth and its sporulation was completely suppressed. Similar effects were shown by *Rhizoctonia solani*, *Phytophthora parasitica*, *Mucor hiemalis* and *Trichoderma viride*, but none of these was so sensitive as *Botrytis cinerea*. Of 2 strains of *Fusarium caeruleum*, one was more sensitive than the other. *Pythium debaryanum* was unaffected in its growth rate. TCNB, as a growth repressant, is fungistatic without being fungicidal. With fungi which are sensitive TCNB was more effective than the penta-derivative, except for *Trichoderma viride* where the converse applied. [From author's abstract.] —Imp. Coll. Sci. Tech., London.

Insecticides.

(*See also* 79, 413f, n, 414a, c, k, m, 423, 491, 1068, 1177.)

396. STUTE, K.
Über die Einwirkung systemischer Insektizide auf Bienen. **(The action of systemic insecticides on bees.)**
Mitt. biol. Bundesanst. Berlin-Dahlem, 1954, Heft 80, pp. 79-81, bibl. 6.

Systox was found to be harmless to bees in the orchard provided they did not come in contact with the spray stream. In intensive fruitgrowing districts bees should be kept in the hive during spraying operations.

397. BATT, R. F., BENNETT, S. H., AND THOMAS, W. D. E.
The absorption, translocation and breakdown of schradan applied to leaves, using 32p-labelled material. I. Experimental techniques.
BENNETT, S. H., AND THOMAS, W. D. E.
II. Evaporation and absorption.
THOMAS, W. D. E, AND BENNETT, S. H.
III. Translocation and breakdown.
Ann. appl. Biol., 1954, **41**: 475-83, bibl. 7, 484-500, bibl. 9, 501-19, bibl. 16, illus.

In the first paper the authors outline the experimental procedure for obtaining, maintaining and sampling the plant material, preparing and applying the radioactive solution, and compiling the results to determine the distribution and status of applied schradan in or on the leaves at harvest.

Part II deals with the absorption of P^{32}-labelled schradan by leaves of apple stocks and seedlings, broad and runner beans, *Coleus* and chrysanthemums. It is considered possible that some breakdown of schradan occurs within the cuticular layer. Absorption appears to proceed through the cuticle in preference to vapour entry through the stomata. Temperature and illumination have important effects on absorption. Young leaves were shown to be generally more absorptive than older ones. Comparisons were also made of absorption by the different species.

Part III deals with the translocation and breakdown of P^{32}-labelled schradan in apples, chrysanthemums, broad and runner beans and *Coleus*. In all species light was shown to be an important factor in translocation. The main direction of translocation is upwards, but some schradan does travel downwards. In apple translocation takes place mainly in the phloem but some may take place in xylem, particularly upwards. No major difference was observed in the ratio translocated/absorbed for *Coleus*, beans and chrysanthemums, but in apples this proportion is greater. The breakdown of schradan into non-chloroform extractables varies between the plant species and is far greater in beans than in *Coleus*. In chrysanthemums and apples the breakdown appears similar throughout the plant, whilst in beans and possibly *Coleus* the breakdown in the untreated sections is higher. Concentrations necessary for the kill of certain species of aphides are given.—Long Ashton Res. Stat.

398. KOLBEZEN, M. J., METCALF, R. L., AND FUKUTO, T. R.
Insecticidal activity of carbamate cholinesterase inhibitors.
J. agric. Food Chem., 1954, **2**: 864-70, bibl. 44.

Amongst several lipoid-soluble carbamates evaluated as insecticides the N-methylcarbamates of *m-tert*-butylphenol, thymol, and carvacrol were highly toxic to the greenhouse thrips (*Heliothrips haemorrhoidalis*).

399. KOULA, V., AND DURASOVÁ, M.
Výzkum insekticidních vlastností minerálních olejů. **(A study of insecticidal characteristics of mineral oils.)** [Russian summary, 8 lines.]
Sborn. čsl. Akad. zeměd. Věd. Ser. A, 1954, **27**: 97-106, bibl. 8, illus.

The suitability of paraffinic and naphthenic oils of Czechoslavak origin for the control of fruit tree pests was investigated under laboratory and field conditions. In field trials during the growing season a paraffinic oil alone or in combination with 0·5% sodium 2,4-dinitro-o-cresolate gave very satisfactory control of aphids (*Doralis fabae*, *Aphis pomi*) and red spider (*Paratetranychus pilosus* [*Metatetranychus ulmi*]). During the dormant period the paraffinic oil plus 9·5% sodium 2,4-dinitro-o-cresolate gave the best results against *Lecanium coryli*, *P. pilosus* and San José scale [*Aspidiotus perniciosus*]. The oil applied in 1 and 2% concentrations during the growing period was not phytotoxic. The characteristics of paraffinic oils recommended for plant protection are given.

400. (Hornstein, I., and Sullivan, W. N.)
Making insecticides last longer.
Agric. Res., 1954, 3 (3): 15.

By using methyl ethyl ketone as a solvent the effectiveness of DDT has been increased to more than 60 days, compared with 14 days for a normal DDT-oil solution. This is due to the fact that the ketone solvent volatilizes rapidly and leaves the DDT on the surface of the leaf, whereas the oil base, carrying the DDT, penetrates into the leaf. The addition of a non-volatile chlorinated terphenyl to aldrin and lindane foliage sprays has increased their effective life from 10 to more than 100 days. [See also *H.A.*, 24: 3689q.]

401. Roubert, J.
Action de quelques pesticides viticoles récents sur la fermentation alcoolique. **(The effect on fermentation of certain chemicals recently introduced for vine protection.)**
C.R. Acad. Agric. Fr., 1954, **40**: 486-7.

The possible action of 2 insecticides and 3 fungicides on grape fermentation was studied. Fermentation was slowed down by captan at 5 mg./1.; this effect was more marked when the commercial product was used. Zineb at 5, 50 and 500 mg./l. had no effect on fermentation, its fungicidal action having no effect on yeasts. Neither parathion nor aldrin affected fermentation, but the oiliness and smell of aldrin had a deleterious effect on the wine. When pure dieldrin was used fermentation was the same as in the controls, but the commercial product, containing quaternary ammonium, caused considerable slowing down of fermentation when used at 50 and 500 mg./l.

Spray apparatus and damage.

(*See also* 207, 413a, p, q, z, 414e, i.)

402. Vanderplank, F. L.
Field experience with spray nozzles in the tropics.
World Crops, 1954, **6**: 488-90, illus.

Several types of sprayer have been compared in Zanzibar, mainly for the control of coconut pests. In one experiment the "Micron" sprayer knocked down 44 times more insects than either the pressure sprayer or the "Swingfog" machine. The "Micron" sprayer has a spinning disc type of nozzle which puts out a large number of droplets that are carried by a blast of air right into the tree. Its advantages for insect and weed control are discussed.

403. Green, H. B.
Spot treatment compared with full coverage.
Miss. Fm Res., 1954, **17** (2): 6.

Tests with single tree plots over a period of 4 years indicated that low gallonage spot treatment of peach trees, to cover the fruit only, was as effective as regular gallonage complete coverage for control of plum curculio and oriental fruit moth.

404. Philipse, W.
"De rugnevelspuit." **(Portable low volume sprayer.)**
Fruitteelt, 1954, **44**: 742-3, illus.

The small low-volume sprayer described is carried on the back of the operator and is driven by a 1·5 h.p. benzene motor. When the tank is full the apparatus weighs 20 kg. It is particularly suitable for spraying fairly low growing crops and small acreages.

405. Kearns, H. G. H., and Morgan, N. G.
Spray application problems: X. The effects of spraying techniques on the control of some fruit insects. Lance and airflow mist spraying.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 139-45, bibl. 4, illus.

Experiments on the control of apple and plum aphides, red spider and apple sawfly by means of air-flow mist spraying are described. DDT emulsion gave virtually complete control of leaf-curling plum aphid when applied by air-flow mist spraying using approximately one-third of the volume of liquid and one-third of the weight of DDT per acre of that used by hand-lance, "run-off" methods. Apple aphides, excluding woolly aphid, were completely controlled by a dilute DDT/gamma BHC emulsion applied at bud burst stage by air-flow mist spraying using approximately one-quarter of the volume and active materials per acre required by lance spraying. Air-flow mist application of an emulsion containing 0·014% gamma BHC at approximately 1 gallon per tree gave a substantial control of apple sawfly. A devastating infestation of red spider and woolly aphid on apples followed the application by air-flow mist spraying of lime sulphur and wetting agent, whereas the same materials applied by hand lance gave a very high control.—[Authors' summary]—The small-volume air-flow machine used was similar to that described earlier [*H.A.*, 21: 3491], with the addition of a special "fish-tail" trunking attached to the fan discharge port. This attachment, which is illustrated, produced a wider vertical sweep of air than was possible before.

406. Aljtman, F. F.
Suspended tractor sprayers for vineyards.
[Russian.]
Vinodelie i Vinogradarstvo, 1954, No. 3, pp. 55-6, illus.

An illustrated description is given of a tractor-mounted apparatus for overhead spraying of vines. The attachment comprises a tall frame holding a very long tube in a horizontal position from which are suspended 8 extensible pipes with 6 nozzles each. Four rows, spaced 2 m. apart, are sprayed from both sides simultaneously and very thoroughly. With this equipment 10-12 ha. can be sprayed in 8 hours, using 500-600 l. of bordeaux per ha. for the first 2 treatments and twice as much for the next 2, applied to more dense foliage.

407. Taylor, E. H., and Harmon, D. B., Jr.
Measuring drop sizes in sprays.
Industr. Engng Chem., 1954, **46**: 1455-7, bibl. 4, diagram.

A description is given of an instrument which allows rapid determinations of drop size distribution in sprays. The drop-measuring instrument uses cold hexane to freeze the water drops, which are then caught on a shutter and dropped to a scale pan. Their weight on the scale pan and time taken by the drops to fall from the shutter to the pan are measured.

408. Waddell, D. B., and McArthur, J. M.
Effects of pruning on spray deposits from concentrate orchard sprayers.
Canad. J. agric. Sci., 1954, **34**: 444-50, bibl. 10, illus.

Dormant and summer sprays were applied to apple trees by hand-gun and concentrate sprayers. For the dormant spray, the concentrate sprayer used 25% of the oil used by the hand-gun sprayer, but oil deposits from the tree tops showed no significant difference. Greater deposits were recovered from trees sprayed in the summer by concentrate sprayer than from those sprayed by the hand-gun sprayer. In unpruned trees the top deposit applied by the concentrate spray was about ½ the bottom deposit, whereas in pruned trees top and bottom deposits were equal. The deposits from sprays applied by concentrate machines on unpruned trees were ½ those on pruned trees; the hand-gun applications gave equal deposits on pruned and unpruned trees.—Ent. Chem. Labs, Summerland.

409. Martin, J. T., and Batt, R. F.
Spray application problems: VII. The determination of DDT in plant materials.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 121-8, bibl. 16.

A rapid method of determining DDT in plant material referred to in an earlier paper [*H.A.*, 24: 371] is fully described, and studies on the extent of penetration of DDT into foliage and fruits are reported. Tests with apple leaves showed that appreciable quantities of DDT penetrated into the leaves, and that, whereas surface deposits were largely lost over a 70-day period, there was little decline in the inside deposits. With fruits (grapes and blackcurrants), on the other hand, internal deposits were negligible. These results show that in the analysis of fruits successive washing with solvent provides a value closely approximating that of the total DDT content, but that with foliage surface stripping is inadequate and more drastic extraction is needed.

410. Ginsburg, J. M., and Reed, J. P.
A survey of DDT-accumulation in soils in relation to different crops.
J. econ. Ent., 1954, **47**: 467-74, bibl. 25.

A study was made in New Jersey on the accumulation of DDT deposits in soils from 12 apple orchards, 10 cornfields, 8 potato farms and 1 cranberry bog commercially sprayed or dusted for insect control during the last 6 years. In soils from apple orchards the DDT ranged, in pounds per acre, from 35 to 113 under trees and from 26 to 61 between trees. Most of the DDT was found in the upper 4 in. of soil, corresponding to the average depth of cultivation. The cranberry bog contained a total of 34·5 lb. of DDT per acre, of which 32 lb. were present in the upper 4 in. of soil. [From authors' summary.]

411. Reckendorfer, P.
Theorie und Praxis der durch Pflanzenschutzmittel verursachten Pflanzenschäden. Mikrochemie der Verbrennungserscheinungen. (**Theory and practice of plant damage caused by plant protection materials. Microchemistry of scorch symptoms.**) [English summary, 3 lines.]
PflSch. Ber. Wien., 1954, **13**: 129-53, bibl. 21.

The cause of leaf chlorosis and scorch are discussed. Toxic agents entering the cell sap disturb the reactions involved in the building-up of chlorophyll complexes. In the second part of the article a method for the micro-determination of zinc in plants is presented.

412. Rui, D., and Bonfante, S.
Le cause della "maculatura non parassitaria" delle foglie di melo. (**The causes of the non-parasitic leaf spot of apple.**)
Not. Mal. Piante, 1954, No. 28, pp. 12-25, bibl. 10, illus.

Investigations show that the non-parasitic leaf spot of apple reported in the Po valley in 1951 [see *H.A.*, 22: 3567] is due to the phytotoxicity of copper when applied under conditions of low temperature and prolonged high R.H. Such conditions occur in spring in parts of the Po valley. The use of sulphur or organic fungicides in spring instead of copper is recommended. The resistance of 15 varieties was investigated. Among these Jonathan, Morgenduft and Reinette du Canada are susceptible or very susceptible, Delicious, Stayman and Wagener are moderately susceptible and Winter Winesap is resistant.—Osserv. Fitopat. Veneto, Verona.

Noted.

413.

a Anon.
New crop-dusting plane.
Agric. Chemls, 1954, **9** (9): 127-8, illus.
The Ag-2, designed in California.

b Baumann, G.
Möglichkeiten und Methoden der Heilung von Pflanzenkrankheiten durch Wärmeeinwirkung. (**On the control of plant diseases by hot-water treatment.**)
Reprinted from *Dtsch. Landw. Berl.*, 1954, No. 2, pp. 4, bibl. 43.
Bacterial, fungus and virus diseases and nematodes.

c Bömeke, H.
Witterungsschäden an Stein- und Kernobstfrüchten. (**Weather damage to stone and pome fruits.**)
Mitt. ObstbVersuchsringes Jork, 1954, **9**: 278-9, illus.
In 1953.

d Bömeke, H.
Virusauftreten im Obstbau-Gebiet der Niederelbe. (**Incidence of virus diseases in the fruit growing area of the Lower Elbe.**)
Mitt. biol. Bundesanst. Berlin-Dahlem, 1954, Heft 80, pp. 175-8. [Continuation of article noted *H.A.*, 23: 400.]

e BONDARENKO, I.
The use of fish oil for the control of rodents. [Russian.]
Sad i Ogorod, 1954, No. 10, p. 74.
Applied to stems of young fruit trees it repelled hares.

f BORGMANN, W.
Hygienische Gesichtspunkte bei der Anwendung von Systox. **(Safety precautions in the application of systox.)**
Mitt. biol. Bundesanst. Berlin-Dahlem, 1954, Heft 80, pp. 64-72.

g BUTIJN, J.
De zoutgevoeligheid van windschermen en fruitbomen op zoute plekken in Zeeland. **(The salt susceptibility of windbreaks and fruit trees on saline areas in Zeeland.)** [English summary, 7 lines.]
Meded. Dir. Tuinb., 1954, **17**: 821-4, bibl. 5, illus.

h CONVERSE, R. H.
Preliminary results in the use of eradicant sprays for pecan scab control.
Plant Dis. Reptr, 1954, **38**: 701-4, bibl. 9.
The fungus being *Cladosporium effusum* and conclusions exploratory as yet.

i DARPOUX, H.
Les antibiotiques en phytopharmacie. **(Antibiotics in crop protection.)**
Proc. 3rd int. Congr. Crop Prot., 1952, Paris, 1953, Vol. 1, pp. 125-48, bibl. 107.

j ENGELBRECHT, D. J.
Virus diseases—their importance for the fruit industry.
Dec. Fruit Gr, 1954, **4**: 168-71, illus.
In South Africa.

k FRAZIER, N. W.
A latent virus of *Fragaria vesca.*
Plant Dis. Reptr, 1953, **37**: 606-608, bibl. 1, illus.

l FRIDLUND, P. R.
The occurrence, distribution, and spread of stone fruit viruses and a virus-like disorder in Minnesota.
From abstr. in *Phytopathology*, 1954, **44**: 488.
Viz. necrotic ring spot, X-disease and a necrotic leaf spotting.

m GOODMAN, R. N.
Apple fruits a source of overwintering fireblight inoculum.
Plant Dis. Reptr, 1954, **38**: 414, bibl. 4.

n HÄFLIGER, E.
Der Einfluss der Temperatur auf die Wirkung von DDT-Präparaten. **(The effect of temperature on the action of DDT preparations.)**
Z. PflKrankh., 1954, **61**: 433-44, bibl. 28.

o HELTON, A. W.
Do you know what certification really means?
Better Fruit, 1954, **49** (3): 6-8, 19-20, 22-3, illus.
The strawberry certification system in Idaho.

p JACKS, H.
A guide to correct use of plant protection methods.
[*Publ.*] *Auckl. Dist. Counc. roy. N.Z. Inst. Hort.*, 1954, pp. 35.

q JACKS, H.
Incompatibility of spray materials.
[*Publ.*] *Plant Dis. Div., D.S.I.R.N.Z.*, [undated], pp. 4.
In tabulated form.

r KEARNS, H. G. H., AND MORGAN, N. G.
Spray application problems: XI. A note on the preparation of a combined DDT-gamma BHC emulsion of high wetting properties as a substitute for winter washes.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 146-8.

s KLINKOWSKI, M.
Der Apfelmehltau und seine Bekämpfung durch Antibiotica. **(Apple mildew and its control by antibiotics.)**
Mitt. biol. Bundesanst. Berlin-Dahlem, 1954, Heft 80, pp. 95-8, bibl. 6.

t LAUE, G.
Cumarin-Derivate mit antikoagulierenden Eigenschaften und ihre mögliche Anwendung in der Nagerbekämpfung. **(Coumarin derivatives with anticoagulant properties and their possible use in rodent control.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1954, **8**: 148-51, bibl. 25.

u MARCUS, C. P., AND DARROW, G. M.
Intergrafting virus-free plants of eight strawberry varieties produced no virus symptoms.
Plant Dis. Reptr, 1954, **38**: 607.

v MARSH, R. W.
Modern developments in research on fungicides.
J. roy. Soc. Arts, 1954, **102**: 555-70, bibl. 16.

w MINISTRY OF AGRICULTURE, LONDON.
Peach leaf curl.
Adv. Leafl. Minist. Agric. Lond., **81**, amended 1953, pp. 3, illus.
Taphrina deformans and its control.

x MINISTRY OF AGRICULTURE, LONDON.
Die-back disease of gooseberries.
Adv. Leafl. Minist. Agric. Lond., **204**, amended 1954, pp. 3, illus.
Botrytis cinerea and its control.

y MINISTRY OF AGRICULTURE, LONDON.
Chafer beetles.
Adv. Leafl. Minist. Agric. Lond., **235**, amended 1954, pp. 4, illus.
7 species and their control.

z MORIONDO, F.
Reazioni in piante di ciliegio a traumi interni provocati da abbassamenti di temperatura. **(Reactions in cherry trees to internal injuries due to frost.)** [English summary, 2 lines.]
Riv. Ortoflorofruttic. ital., 1954, **38**: 321-7, bibl. 13, illus.
Histological studies of frost-damaged morello cherry shoots.

414.

a POTTER, C.
The mechanism of action of [mainly contact] insecticides.
Proc. 3rd int. Congr. Crop Prot., 1952, Paris, 1953, Vol. 1, pp. 149-69, bibl. 68.

b RAMSON, A.
Viruskrankheiten im deutschen Steinobstbau. **(Virus diseases of stone fruit in Germany.)** *Dtsch. Gartenb.*, 1954, **1**: 295-300, bibl. 23, illus.

c RIPPER, W. E.
Systemic insecticides.
Proc. 3rd int. Congr. Crop Prot., 1952, Paris, 1953, Vol. 1, pp. 171-206, bibl. 141.
A review of recent work.

d STEIN, G. H. W., AND TELLE, H. J.
Über eine Feldmausversuchsbekämpfung, Verlauf und vorläufige Ergebnisse. **(Experimental field mouse control, progress and preliminary results.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1954, **8**: 121-8, 141-7, bibl. 10, illus.
Plenty on the mouse, but very little on his control.

e STEINEGGER, P., AND RESCHELEIT, C.
Untersuchungen über die toxische Wirkung von Obstbaumspritzmitteln auf die Legetätigkeit bei Leghornhennen. **(Studies on the ill effects of top fruit sprays on the laying performance of Leghorn hens.)**
Schweiz. Z. Obst-u. Weinb., 1954, **63**: 441-4.
Several sprays tested had no ill effects.

f SWIRSKI, E.
The bionomics of the pear psylla, *Psylla pyricola*, Foerst. in Israel.
Ktavim*, 1954, **4: 61-8, bibl. 12.

g THOMAS, W. D. E.
Applications of the radioactive tracer technique to problems in plant nutrition and crop protection. Summary of experiments during the period 1948-1953.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 102-8, bibl. 16.
Work at Long Ashton reviewed.

h UNTERSTENHÖFER, G.
Probleme und Aussichten der inneren Therapie bei Pflanzen. **(Problems and prospects of plant chemotherapy.)**
Mitt. biol. Bundesanst. Berlin-Dahlem, 1954, Heft 80, pp. 51-64, bibl. 24.

i U.S. DEPARTMENT OF AGRICULTURE.
How to spray the aircraft way.
Fmrs' Bull. U.S. Dep. Agric., **2062**, 1954, pp. 32, illus., 15c.
A guide for farmers and pilots.

j VARNEY, E. H., AND MOORE, J. D.
Tobacco and zinnia—two new herbaceous hosts for Prunus virus.
From abstr. in *Phytopathology*, 1954, **44**: 509.

k VERDEJO VIVAS, G.
Los insecticidas sistémicos. **(The systemic insecticides.)**
Arch. Inst. Aclimat., 1953, **1**: 157-64, bibl. 14.

l WILSON, E. E.
Seed-transmission tests of almond bud failure disorders.
From abstr. in *Phytopathology*, 1954, **44**: 510.

m WOODCOCK, D.
The effect of chemical structure on biological activity: the significance of chlorine in certain insecticides, fungicides and plant growth-regulators.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 96-101, bibl. 27.
A review of research at Long Ashton and elsewhere.

* English edition.

WEEDS AND WEED CONTROL.

General.

(*See also* 492e, g, 1151.)

415. HILTON, R. J.
Weed control in horticultural crops.
Proc. 7th west. Canad. Weed Control Conf. 1953, Edmonton, Alberta, pp. 47-51.

Chemical control of weeds in fruit, vegetable and ornamental crops is briefly reviewed, and the danger some materials may constitute, particularly in home gardens and seed production, is pointed out. Weed control by mechanical means is mentioned and problems facing growers and research workers under conditions of the Prairie Provinces are set out in a 5 point summary.

416. RIPLEY, P. O.
Getting experimental work done.
Proc. 7th west. Canad. Weed Control Conf. 1953, Edmonton, Alberta, pp. 82-8.

From replies received to a questionnaire a review was prepared indicating the scope of weed research work in Canada. Some 20 units were engaged on weed control experiments in the Western Provinces, and a similar number in the Eastern Provinces. A list of active projects shows that control investigations, which cover work in fruit and vegetables, seem well advanced, but that there is little basic research. Further information is given on the extent of work, detailing number of projects, man hours and cost, weed species studied, results obtained and future problems.

417. WESTERN CANADIAN WEED CONTROL CONFERENCE.
Report of the herbicide and weed classification committee.
Proc. 7th west. Canad. Weed Control Conf. 1953, Edmonton, Alberta, pp. 108-18.

Information on the following points is given: selective weed control in horticultural crops, control of woody plants, soil sterilants, perennial weeds requiring special control measures, and weed classification according to response to 2,4-D and MCP.

418. NORTH CENTRAL WEED CONTROL CONFERENCE.
Recommendations of the research committee of the N.C.W.C.C.
Proc. 10th annu. Mtg N. centr, and Abstr. Paps 1st nat. Weed Control Confs 1953, Kansas City, Mo, pp. 63-74.

Cover: Control of perennial weeds, woody plants; weed control in vegetables, small fruits, ornamental shrubs, flowers, turf, and definition of abbreviations.

419. HAMNER, C. L., AND RAI, G. S.
A new method of weed control.
Agric. Chemls, 1954, **9** (10): 65, 117.

An economical method of paper mulching is advocated. Waste newspapers are soaked and then shredded, and placed around the growing crop. The mulch dries out and hardens on the soil surface, thus preventing weed growth.

Particular weeds.

(*See also* 492d.)

420. CONWAY, E., AND STEPHENS, R.
How the bracken plant reacts to treatment.
N.A.A.S. Quart. Rev., **25**, 1954, pp. 1-15, bibl. 18, illus.

Where ploughing is not possible, attempts have been made to control bracken, *Pteridium aquilinum*, by destroying the fronds either mechanically or chemically. In recent experiments in the West of Scotland, the first observed effect of cutting away the fronds was an increase in the number which expanded the following season. A significant reduction of expanding fronds was seen only after 3 years of intensive cutting. Even then, when the treatment was discontinued the plants recovered, and, should there be no further cutting, they would soon re-establish. Chemical methods of bracken control have so far been even less successful. Contact weed killers such as sodium chlorate killed only the fronds, leaving the underground stems unharmed, and spray applications of the growth regulating herbicides MCPA, 2,4-D, 2,4,5-T and their mixtures produced similar effects.

421. WESTMORELAND, W. G., KLINGMAN, G. C., AND UPCHURCH, R. P.
Nutgrass (nutsedge) control.
Ext. Folder N.C. agric. Ext. Serv., **103**, 1953, pp. 5, illus.

According to conditions, one of the following methods of eradicating *Cyperus rotundus* may be used: (1) Plant a dense rapid-growing summer shade crop for 2 years. (2) Disk thoroughly at 2-3 week intervals over 2 growing seasons. (3) Use 1½ lb. sodium chlorate per 100 square feet to sterilize soil. (4) Use ½ to ¾ lb. 2,4-D acid equivalent per acre at 2-3 week intervals for at least 2 growing seasons. (5) In non-agricultural land use CMU at 40 lb. (80% wettable powder) per acre.

422. DOMATO, J.
Experiencias sobre métodos de trasplante de plantas citricas. Su importancia en la luchar contra el *Cyperus rotundus* L. **(Methods of transplanting citrus and their importance in the control of *Cyperus rotundus*.)**
Rev. industr. agric. Tucumán 1948-52, 1952, **38**: 7-18, illus.

Nutgrass was declared an agricultural pest in Argentina in 1946. A nursery in which the presence of such a declared pest is established is obliged by law to eliminate it within 6 months and meanwhile to issue only plants with bare roots. To compare the effect of ball and bare-root planting small-scale plantings of 5 orange varieties, all on sour orange stocks, were made in 1944 and kept under observation until 1948. Ball-planted plants showed much greater growth and yield in all cases and their death rate was nil compared with 12%.

423. WATTS, J. G.
Response of nut grass to soil applications of organic insecticides.
J. econ. Ent., 1954, **47**: 435-8, bibl. 7.

A striking increase in nut grass, *Cyperus rotundus*, populations reported from South Carolina appears to be associated with accumulations in the soil of chlordane, DDT, toxaphene and especially BHC, but not with parathion. The mechanism of this "stimulation" is not understood, but it is thought possible that the insecticides have upset the auxins which control apical dominance in nut grass rhizomes.

424. CORNS, W. G.
Chemical control of weedy grasses.
Proc. 7th west. Canad. Weed Control Conf. 1953, Edmonton, Alberta, pp. 61-4.

Information from 24 abstracts is condensed and classified according to results obtained with different chemicals on annual grass (green foxtail) in crops, and on perennial grass (couch grass) not in crops. For selective control of foxtail, in field peas TCA at 4 lb. per acre, and in turnips, beans and beets Dalapon at 2, 3 and possibly 6 lb. per acre appeared satisfactory. Against couch grass, given rates of TCA, Dalapon, CMU, certain mixtures of these, and some other chemicals were effective.

425. MOORE, R. M.
Studies on perennial weeds: the control of hoary cress (*Cardaria draba*) by chlorinated phenoxyacetic compounds.
Emp. J. exp. Agric., 1954, **22**: 112-20, bibl. 4.

Experiments conducted in Australia between 1946 and 1951 showed that a rate of 2–3 lb. acid equivalent per acre of sodium MCPA gave maximum reduction of *Cardaria draba* in the following year, though partial recovery of the plants occurred between 6 and 12 months after treatment. Recovery after a second application was less than after the first application, irrespective of dosage rate. Two applications of sodium MCPA each at 1 lb. acid equivalent per acre were as effective as 2 applications at higher rates, and gave a greater kill than 1 heavy application. There was some evidence that plants previously sprayed become more susceptible to subsequent applications. Single applications of several derivatives of 2,4-D, MCPA and 2,4,5-T showed visible differences in toxicity for 2 years, but there were no differences after a second spray application. Wimmera rye-grass (*Lolium rigidum*) occurred naturally on plots in which the density of *C. draba* had been reduced by phenoxyacetic acid compounds, and the possibility that this grass was a factor in control is discussed.—Div. Plant Ind., C.S.I.R.O.

426. Martirosjan, G. A., and Sazonova, P. A.
Chemical means of controlling *Acroptilon picres*. [Russian.]
Zemledelie, 1954, **2** (6): 110-14, illus.

In the experiments described repeated applications of the butyl ester of 2,4-D gave the most satisfactory control of the troublesome perennial weed *Acroptilon picres*, Compositae. Application of the material in a plum orchard over 2 seasons at 0·2 and 0·3 kg. per ha in 1,000 l. water reduced *A. picres* infestation and controlled many other weeds.

427. Kuročkin, P. M.
***Actoptilon picres* and means of controlling it.** [Russian.]
Zemledelie, 1954, **2** (6): 115-19.

In row crops hoeing is recommended for the control of *A. picres*, and in cereals and grass 5% sodium arsenate gave the best results.

428. Kehl, F. H., and Rajiah, E. S.
***Eupatorium riparium* Benth. (Compositae), a common weed up-country.**
Tea Quart., 1954, **25**: 27-8, bibl. 1.

Eupatorium riparium, an alternative host of the tea pest *Lygus viridanus* [see abstract 1120] is effectively controlled by 2 lb. sodium chlorate plus 1 cigarette tinful of teepol per 10 gal. water at 100–200 gal. per acre. Sodium chlorate should not be used in standing tea to which it is harmful.

429. Wild, H.
Rhodesian witchweeds (*Striga* and *Alectra* species).
Rhod. agric. J., 1954, **51**: 330-42, bibl. 9, illus.

Information is given on *Striga gesnerioides*, *Alectra kirkii* and *A. vogelii*, of which the first 2 are parasites on tobacco and the third on cultivated legumes including broad bean. Control is principally by early eradication of invading specimens.

430. Fullaway, D. T.
Biological control of cactus in Hawaii.
J. econ. Ent., 1954, **47**: 696-700.

With the establishment of the introduced insects *Cactoblastis cactorum* and *Dactylopius opuntiae*, biological control of *Opuntia* spp. appears most promising.

431. Editorial Subcommittee Regional Technical Committee Project NC-10 (Buchholtz, K. P., chairman).
Weeds of the North Central States.
Circ. Ill. agric. Exp. Stat., **718**, being *Publ. N. centr. Reg.*, **36**, 1954, pp. 239, bibl. numerous, illus.

More than 200 weeds are described and illustrated, and their geographical distribution and conditions under which they are likely to be found are indicated. Well arranged identification keys, a glossary of technical terms and an index listing scientific and most common popular names are given.

Control of aquatic weeds.

432. Oborn, E. T.
Weed control investigations on some important aquatic plants which impede flow of western irrigation waters.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, pp. 12-13.

Rates of 2,4-D are suggested for control of various aquatic species. In both the predominantly submersed and emergent treated plants radioactive 2,4-D readily passed the water line and also accumulated in the roots. CMU at concentrations below 10 p.p.m. killed most of the submersed plants tested, and at concentrations between 15 and 19 p.p.m. killed all emergent plants observed including watercress and water hyacinth. Apparently CMU will control water weeds at concentrations safe for aquatic fauna, including fish. The use of aromatic solvents is also mentioned.

433. Hodgson, J. M.
Control of submersed waterweeds in irrigation canals.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, pp. 13-14.

Submersed aquatic weeds can be effectively controlled with aromatic solvents. Most of the solvents used for water weed control are of petroleum origin, but those of coal tar origin are equally effective. Rates of 5·5 to 10 gal. of aromatic solvent per cubic foot per second flow of water, introduced over 30 min., have been found to kill different species under various conditions. Irrigation of crops, including carrots, lettuce, lima beans and orchard grass, with treated water caused no significant reduction in yield. The solvent, however, is lethal to fish, snails and insects found in irrigation channels. Against algae copper sulphate and rosin amine D acetate showed promise. [See also *H.A.*, 24: 2575.]

434. Timmons, F. L., and Lee, W. O.
Control of emergent aquatic weeds in irrigation canals.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, p. 14.

In 17 western states cattails (*Typha* spp) are the most important of the emergent aquatic weeds. Narrow-leaf cattail (*Typha angustifolia*) is being successfully controlled by spraying at the preheading stage with a solution containing 1·5 lb. of 2,4-D, 8–10 lb. of sodium TCA and ¾–1 pt. of a spreader in 100 gal. at the rate of 400–600 gal. per acre of water. Against broadleaf cattail (*Typha latifolia*) the best results were obtained with 4–8 lb. of a low volatile ester of 2,4-D plus 10 gal. of diesel oil per acre in 200 gal. Two applications per season at preheading stages of growth were much more effective than one application at the heading stage.

Control of woody plants.

(*See also* 492a.)

435. Currey, H. D.
Brush control in British Columbia.
Proc. 7th west. Canad. Weed Control Conf. 1953, Edmonton, Alberta, pp. 88-93.

Mainly with the ester formulations of 2,4-D, 2,4,5-T and their mixtures, with oil added to the water solution. Foliage applications are showing more consistent results than dormant or basal treatments. Drift damage to nearby susceptible species can be prevented by the use of brush killers of low volatility applied at low pressure in calm weather.

436. Crafts, A. S.
Use of radioactive isotopes of 2,4-D in brush control.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, pp. 14-15.

Radioautographs of bark, shoot tips and leaves of brush species treated with radioactive 2,4-D show that movement of this indicator parallels that of foods in these plants. Depending upon physiological activity, movement from a treated leaf may be downward to the roots, upward to growing shoot tips, or in both directions. Since brush consists of mixed stands that contain both deciduous and evergreen species, in which the desired physiological activity occurs at different times of the year, there can be no one optimum time or condition for treating such populations.—Univ. Calif., Davis.

437. Larson, R. E.
New developments in brush control.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, pp. 16-17.

Highly condensed notes are given on some interesting research results mainly on translocation. In one experiment on mesquite little or no downward movement was observed and basal applications of 2,4,5-T ester in diesel oil are recommended for control. In another study, using radioisotopes as tracers with 2,4-D [see also abstr. No. 436], downward movement was noted in the bark of certain species in the winter which might be the reason for the success of dormant sprays on these species. The use of a probe applicator. placing the herbicide about 4 in, below the soil surface and adjacent to the primary axis, gave good results. Post and blackjack oaks of 6 in. or less stem diameter were completely killed with low volatile esters of 2,4-D or 2,4,5-T in oil applied by this method during the period of leaf expansion. These studies also indicate that the amount of herbicide is apparently more important than the concentration of the solution. Undiluted 2,4-D and 2,4,5-T applications to axe cuts have also given good results.

438. Goddard, R. E.
Killing small undesirable hardwoods by use of the Cornell tool.
Down to Earth, 1954, **10** (2): 5, illus.

The Cornell tool is an implement designed to inject herbicides into cuts in the base of tree trunks. Data are tabulated comparing the effectiveness of the Cornell tool and basal sprays as methods of applying 2,4,5-T ester for control of various hardwood tree species. Just over a year after application the kill of trees under 10 inches in diameter was 88% for the Cornell tool and 53% for the basal spray method.

439. Parham, B. E. V.
Weed control. A note on experimental materials: ethone and XY 2631.
Agric. J. Dep. Agric. Fiji, 1953, **24**: 109.

Ethone was tested on guava scrub, which is difficult to control by mechanical means because of suckers which grow out in numbers when trees are cut down or grubbed out. Applied by means of a Cornell tree-stabbing tool which injects a small quantity of fluid into a scar or cut made at each blow on the base of the tree, it gave striking results. All trees were dead within 3 months and there was no re-growth. Warm weather treatment was best.

Weed control in fruit crops.

440. Denisen, E. L.
Weed control in small fruits.
Trans. Ill. St. hort. Soc. for 1953, 1954, **87**: 64-9.

Sodium 2,4-dichlorophenoxyethyl sulphate (Crag Herbicide 1) was used successfully against weeds in strawberries and raspberries [see also *H.A.*, 24: 388].

441. Childs, W. H.
Controlling weeds in strawberries with Crag herbicide 1.
A.R.W. Va agric. Exp. Stat. 1953-1954, issued as *Science Serves your Farm, Bull.*, **363**, Part 3, 1954, pp. 4-5, 2, illus.

In 1952, Crag 1 [2,4-dichlorophenoxyethyl sulphate] was applied at the rate of 4 lb. per acre to weed-free strawberry plots from 3 July to 25 September at 1–4 weeks interval. The effects of these treatments on weed control and on the following season's production are discussed, and it is suggested that applications at 3-week intervals will be preferable under most conditions.

442. Davidson, J. H.
Preliminary trials with Dowfume MC-2 for reducing weed problems introduced in strawberries by mulching materials.
Down to Earth, 1954, **10** (2): 3-4, illus.

The value of methyl bromide (Dowfume MC-2) as a fumigant for control of weed and grain seeds in mulching straw was investigated in preliminary trials in Michigan. Dry or moistened straw in bales was fumigated under a gasproof cover in March. Dowfume MC-2 was used at ½, 1 or 2 lb. per 4 bales (1 cubic yard), the exposure time being 2½ days; during this time the air temperature did not exceed 60° F. The straw was spread as a mulch on strawberry plantings 5 days after the removal of the covers. The amount of weed growth was greatly reduced on plots mulched with wet-fumigated straw at all rates of methyl bromide. Fumigation of dry straw was much less effective in destroying weed seeds. Ragweed, however, was not destroyed by fumigation even in wet-treated straw, which suggests that the seeds had not absorbed sufficient moisture to be susceptible to MC-2 at time of treatment.

443. Carew, J.
Fumigating baled straw for mulching.
Down to Earth, 1954, **10** (2): 2, illus.

A trial at Cornell University showed that fumigating baled wheat straw with methyl bromide, before using it as a winter mulch for strawberries, caused a marked reduction in the number of weeds introduced by the straw. The method used was to enclose 4 bales of dry straw in a bag of tubular plastic closed at both ends and to release a 1 lb. container of Dowfume MC-2 within the bag. After 24 hours the bales were removed and stored. Strawberry plots mulched with the fumigated straw were virtually weed-free the following spring, while the untreated straw brought in many weeds among which wheat predominated.

444. Fletcher, R. G. T.
Orchard weed control by spraying.
Comm. Gr, 1954, No. 3066, p. 646, illus.

Broad-leaved weeds entangled in the mesh wire netting surrounding young apple trees were completely destroyed in one orchard by spraying with a DNC in oil concentrate at 1 pt. to 2½ gals. water. Spraying was first done in May and repeated in June, July and August for a total cost, excluding labour, of about ½d. per tree. So long as the spray did not touch immature wood the trees suffered no damage, and sucker growth was suppressed.

Weed control in ornamentals and turf.

445. Bing, A.
The chemical weed control of some ornamental crops.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, p. 23.

In dormant nursery stock in New York, dinitros and chloro-IPC sprays at 1 50 effectively controlled chickweed, yarrow, annual blue grass and other weeds. The nursery stock remained undamaged. Pre-emergence sprays on gladiolus with chloro-IPC, 2,4-D plus NaTCA and dinitros followed by Crag herbicide No. 1 have given good early weed control. Crag No. 1, Sesin, Natrin and Alanap No. 2 applied to carnations gave variable weed control but caused no or only slight crop injury. For chrysanthemums, Crag No. 1 showed the most promise, and for azaleas Sesin. As pre-planting treatments, steam, methyl bromide, chloropicrin and other soil sterilization methods are sometimes preferable to herbicidal sprays.

446. Holm, L., and Beck, G. E.
The effect of herbicides on gladiolus flower, corm, and cormel production.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 447-52, bibl. 4.

The results of 3 seasons of work on the effect of pre-emergence herbicides on flower, corm, and cormel production in gladiolus are presented. TCA, 2,4-D, CMU, DNBP, Endothal, CIPC, and the mixture of 2,4-D with TCA when applied at suitable rates are safe for use in gladiolus. TCA at 20 pounds per acre retarded flower production and lowered the yield of corms and cormels. CMU at 4 pounds per acre reduced the yield of cormels. These experiments were conducted on a silt loam soil. The general nature of herbicidal activity is such that increased toxicity may be anticipated with any of these chemicals when used on lighter soils. CMU and the combination of 2,4-D with TCA provided excellent control of both broad-leaved weeds and grasses. 2,4-D, when used alone, and DNBP provided very satisfactory control of broadleaved weeds only. TCA, Endothal, and CIPC were very effective for the control of grasses in this crop. [Authors' summary.]—Univ. Wis., Madison.

447. Peabody, D. V.
Further investigations of chemical weed control in bulb crops.
Proc. Bulb Grs' short Course 1954, Tacoma, Wash., pp. 35-6.

Trials were made on weed control in tulips, irises and daffodils. Winter annual weeds were controlled by pre-emergence sprays of dinitro amine at 4·5 lb. active ingredient per acre and by CMU at 1–2 lb. per acre without any bulb injury being observed. A post-emergence spray of 0·8 lb. active ingredient of CMU per acre gave good control of summer annual weeds. 3-chloro IPC is also recommended as a post-emergence herbicide, but is less effective than CMU. No toxic effects of the herbicides were seen when the bulbs were subsequently forced. [For earlier work see *H.A.*, 23: 4117.]

448. Akamine, E. K., and Nakasone, H. Y.
Control of weeds in orchid culture with special reference to the effect of CMU on *Oxalis corniculata* L.
Na Pua Okika o Hawaii Nei (*Orchids of Hawaii*), 1954, **4** (1): 3-10 from abstr. in *Biol. Abstr. Sect. D*, 1954, No. 21954.

Of 9 herbicides tested on 5 orchid genera only CMU proved satisfactory. The application of CMU to potted orchids at 5–6 mg. per 4- to 6-in. pot effectively controlled *Oxalis corniculata* for nearly a year without affecting the orchids.

449. Anon.
Football field turf improves with Dowfume MC-2.
Down to Earth, 1954, **10** (2): 6-7, illus.

Fumigating the soil of a sports field with methyl bromide, after ploughing under the old weedy turf and before resprigging, resulted in a clean good turf. The method is described in detail.

450. (DeFrance, J. A., and Hart, S. W.)
Crabgrass control.
Agric. Chemls, 1954, **9** (9): 86.

Tests at the Rhode Island Agricultural Experiment Station showed that phenyl mercury acetate, boronium fluoride and potassium cyanate solutions, activated sludge mixed with potassium cyanate and potassium cyanate dusts gave from 92 to 100% control of crabgrass. There was no permanent injury to the basic grasses, Kentucky bluegrass, Chewings' fescue and Astorial colonial bent, from any of the treatments. Discoloration of grass was least with activated sludge/potassium cyanate and greatest with potassium cyanate solution. Discoloration was temporary and most likely to appear when the grass is weak, the temperature very high or the soil dry. On lawns phenyl mercury compounds can be used either liquid or dry whenever crabgrass is visible, preferably before it matures. Three applications are usually needed.

451. Dawson, R. B.
The control of weeds in turf.
J. Sci. Food Agric., 1954, **5**: 392-7.

Of all the problems associated with turf management, weed control is pre-eminent, since certain weeds are universal where grass is cut short. Short mowing determines the weed species that are able to persist, and by reducing ground-floor competition permits their increase. By good management a weed-free sward can be kept in this state for a long period, but the production of a weed-free turf is a problem facing most turf users. Methods of control involve mechanical operations, such as raking, and the use of chemicals, varying from the sulphates of ammonia and iron to the plant poisons and then to the growth-regulating substances or "hormone" weedkillers. Methods of using all these are described, with data on the effects of repeated application of the selective weedkillers for resistant weeds. The best conditions for use are also described. Reference is made to 2,4,5-T for weed control in turf and also to growth-stunting chemicals such as maleic hydrazide. There is a possibility of controlling growth of long grass (on verges or in cemeteries, for example), but for fine turf there seems to be little likelihood of future application of such materials.—[From author's abstract]—St. Ives Res. Stat., Bingley, Yorks.

452. Blandy, R. V.
The control of mosses in lawns and sports turf.
J. Sci. Food Agric., 1954, **5**: 397-400, bibl. 1.

Following a discussion of different types of moss and their control by cultural and chemical means, the results are given of a trial in which calomel (mercurous chloride) was incorporated with an ordinary lawn sand containing 20–25% each of ammonium sulphate and ferrous sulphate. The mixture was applied in May at 4 oz./sq. yd., the rate of application of the calomel being approximately 1 g./sq. yd. The addition of the calomel prevented the reappearance of moss for a whole season. —Tilgate Res. Stat., Crawley, Sussex.

453. Castaño A., J. J.
Efectos letales del matamalezas "Shell" 40-F2 sobre la suelda (*Elephantopus* sp.) y su acción fitotóxica en otras plantas. **(The lethal effects of Shell herbicide 40-F2 on *Elephantopus* sp. and its phytotoxicity to other plants.**
Agric. trop. Bogotá, 1954, **10** (6) 9-13, illus.

Shell herbicide 40-F2, with a 2,4-D base, gave complete control of *Elephantopus* sp. in a lawn in Colombia when used at a concentration of 250 cc./100 litres water in an atomized spray. A higher concentration was needed for control of *Sida acuta*. The spray drift caused foliage injury to papaw, capsicum and several ornamental plants.

Weed control in tropical crops.

(*See also* 492i.)

454. Robinson, J. B. D.
Report on the progress made with chemical control of weeds in coffee.
Mon. Bull. Coffee Bd Kenya, 1954, **19**: 204-8, bibl. 4, illus.

In an observational trial in the short rains in 1953 PCP alone and with added 2,4-D was applied in low and medium volumes as both post-weed and pre-weed plus post-weed emergence sprays in mulched and unmulched areas. All treatments reduced weed growth significantly. PCP plus 2,4-D was more effective than PCP alone. The pre-plus post-weed emergence treatment was more effective than the post-weed emergence application. Residual weed growth was significantly less on mulched than on unmulched areas, perhaps partly owing to the suppressant effect of the mulch. PCP plus 2,4-D was very effective against nutgrass (*Cyperus auricomus*). There was some drift onto lower foliage and some tainting resulted. In a full-scale trial in an unmulched area in the long rains of 1954 $2\frac{1}{2}$ lb. PCP plus 1 lb. acid equivalent 2,4-D applied twice at 38 gal. per acre gave complete practical control of weed growth. The use of a canopy-protected lance prevented drift.

455. Tea Research Institute of East Africa.
Weed killers.
A.R. Tea Res. Inst. E. Afr. 1953, 1954, pp. 20-2.

The search continues for an economical method of controlling *Digitaria scalarum* in place of cultural operations so severe that the tea suffers. TCA (which affects tea), Sovacide (heavy oil) and concentrated sulphate of ammonia were compared in a statistically uncontrolled experiment on unplanted land. Only TCA was effective; at 60 lb. per acre it reduced the proportion of this grass in the herbage to 15% compared with 73% in the control, a result which suggests that TCA may be useful on newly opened land.

456. Coombes, S. N.
The development of chemical weed control in Mauritius.
Plant Prot. Overs. Rev., 1954, **4**: 103-7.

The main industry in Mauritius is sugar manufacture and weeding is one of the most important cost items in sugar cane production in Mauritius. Chemical control of weeds is now the generally accepted practice, and MCPA and 2,4-D are applied pre-emergence to both plant cane and ratoons. Post-emergence treatments have been tested for the combined control of broad-leaved and grassy weeds. The results indicate that a mixture of amine 2,4-D or sodium MCPA and TCA may meet most weed control requirements in cane fields.

457. Rochecouste, E.
Le désherbage chimique des plantations de canne à sucre. **(Chemical weed control in sugar-cane plantations.)**
Rev. agric. Maurice, 1954, **33**: 160-70.

In experiments at 2 localities good weed control was obtained in ratoon cane with ⅓–½ gals. PCP plus 1½–2 lb. acid equivalent MCPA (or 2,4-D amine salt) plus 5 lb. TCA per arpent (1·04 acre). Three weeks after treatment the mortality of annual and perennial weeds was 64–81% and 46–68% respectively. Two months after treatment annual and perennial infestations expressed as percentages of the control were 32–45 and 49–65 respectively. A minimum of 45 gals. water per arpent is considered to be required for effective spraying. A mixture of 40 lb. sodium chlorate and 60 lb. TCA per arpent is recommended for weed control before replanting.

Weed control in vegetables and tobacco.

458. Shadbolt, C. A., and Holm, L. G.
A quantitative study of the competition of weeds with vegetable crops.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, p. 21.

In studies conducted at the University of Wisconsin it was found that moderate levels of weed competition caused severe injury to carrots, onions and beets. There was some recovery, however, from initial injury after the competition was removed. There was considerable injury to the crop early in the season, a fact which shows the importance of the timely removal of weeds. Light intensity round the crop plants was reduced by as much as 85% at the higher levels of competition. Light intensity at the various levels of competition was inversely proportional to the injury observed. It is suggested that light plays a major role in competition. Leaf area of the crop was severely reduced as a result of weed competition. Beets were able to recover somewhat better from initial injury than carrots. In onions injury resulting from low levels of early competition was more severe, and they were able to withstand much less total competition.

459. Berezovkiĭ, M. Ja.
The use of herbicides in agriculture. [Russian.]
Agrobiologija, 1954, No. 2, pp. 37-48, bibl. 11.

A review is given of Russian work including weed control in vegetables with the more popular herbicides such as 2,4-D isopropyl phenyl carbamate, dinitro compounds, mineral oils, calcium cyanamide and potassium cyanate. The action of some of the chemicals is described and methods of application and equipment used are discussed.

460. Berezovskiĭ, M. Ja.
The use of herbicides in vegetable production. [Russian.]
Zemledelie, 1954, **2** (6): 98-106, illus.

The mode of action and rate of decomposition of 2,4-D and MCPA and plant susceptibility are discussed. 2,4-D decomposes in the soil more rapidly than MCPA, but it was found that under certain conditions susceptible plants, such as tomatoes, can be safely planted 3 weeks after MCPA treatment. IPC applied pre- and post-emergence in beetroots and carrots gave very good control of chickweed and increased yields. It is suggested that IPC could also be applied to other vegetables infested with chickweed, with the exception of solanaceous plants and cucurbits. In Umbellifers mineral oils, and in onions calcium cyanamide applied pre-emergence and potassium cyanate applied post-emergence gave good weed control.

461. Datta, S. K., and Banerjee, G.
Chemical control of some weeds of Darjeeling.
Sci. and Cult., 1954, **20**: 191-3, bibl. 4, illus.

Laboratory tests were made with weed-killers of the aryloxy-acetic acid group in the control of *Polygonum nepalense* and *Hydrocotyl japonica*, 2 troublesome weeds of terrace cultivation of vegetables and flower gardens and lawns in the Darjeeling hill area. 2,4-D was the best. Its mercury salt was highly effective.

462. Carlson, R. F.
Some responses of several horticultural plants to CMU, 3-CIPC and Dalapon under greenhouse conditions.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, p. 23.

The 3 herbicides were tested under high temperature conditions (90 to 110° F.) on the following plants: common beet, cabbage, broccoli, turnip, muskmelon, cucumber, carrot, lettuce, tomato, parsnip, lima bean and sweet corn. The materials were applied at 3 rates each in 720 gal. of water either pre- or post-emergence. CMU was toxic to all species. When cucumber, corn and asparagus seed was planted in the CMU-treated soil 105 days after the original application, the cucumbers died, corn was stunted at the highest rate and the asparagus grew normally at all rates. Treatments with 3-CIPC killed some species and stunted others but did not appear to injure carrot, parsnip, bean or sweet corn plants. Except for the beets, all the crops survived the Dalapon (2,2-dichloropropionic acid) treatments, though most of them looked stunted and showed chlorotic leaves.

463. Guzmán, V. L., and Wolf, E. A.
Weed control in onions in the organic soil of the Florida Everglades.
Weeds, N. York, 1954, **3**: 66-74, bibl. 11, illus.

Materials and rates applied in 1 pre-emergence and 2 post-emergence experiments are given. In the pre-emergence test chloro-IPC and 2,4-D gave the best weed control, but they reduced the stand of onions. In the post-emergence tests all treatments caused temporary burning on the leaves of the onions and significantly reduced yields. CMU and sulphuric acid gave the best weed control, and yields from these plots were significantly greater than from the other treated plots, although significantly less than from the control. After 1½ months storage no difference in quality due to treatment was observed.

464. Timmons, F. L., and Hawthorn, L. R.
Promising herbicidal methods for the control of annual weeds in seed onions.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, pp. 18-19.

A directed spray application of 3 lb. per acre of 2,4-D acid or ethyl sulphate when the onions were beginning to bolt, followed by a moderate rainfall, either natural or artificial, was the most promising treatment tested. It gave excellent season-long control of annual broadleaf weeds and grasses and resulted in seed yields equal to or greater than those of the hand-weeded control. CMU at 2 lb. per acre gave better weed control than any other chemical tested, but in some instances it reduced seed yields. Like 2,4-D, CMU gave good results only when moderate rainfall followed the treatment. When surface irrigation only was given, weed control was unsatisfactory and the onions were likely to be injured.

465. Nylund, R. E.
Studies on chemical weed control for muckland onions.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, p. 19.

CMU has consistently given better weed control in onions than other herbicides when used as a pre-emergence, early post-emergence, or lay-by treatment. In most tests at the University of Minnesota it has not been any more toxic to muck-grown onions than other herbicides recommended for this crop. Under certain unknown conditions, however, 2 lb. of CMU per acre applied either pre- or post-emergence may reduce yields by 20–25%, and if both applications are made by as much as 40%. Lay-by treatments at the same rate did not affect yields.

466. Perkins, D. Y.
Chemical control of purslane in muck-grown onions.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, p. 19.

In New York chloro-IPC was the only chemical that caused no reduction in yield or visual symptoms of damage to onions regardless of time or rate of application. This chemical also gave better control of purslane than any other material.

467. Warren, G. F., Larsen, J. E., and Ellis, N. K.
Five years' research on weed control in Indiana onions.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, pp. 20-1.

Materials, rates and methods of application used in pre-emergence, early post-emergence, directional post-emergence and post-emergence residual treatments are described. Several of these treatments were effective in reducing the amount of hand labour required for weeding onions, but to obtain maximum effectiveness a series of treatments is necessary throughout the season. Due to the variability in weed population and environment no one sequence can be recommended for all locations.

468. Andersen, E. T.
Chemical weed control studies with peas.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, pp. 25-6.

In Manitoba, under the abnormally wet growing conditions of 1953, MCP sodium salt applied by low volume equipment at 1¼ to 1½ oz. of active ingredients per acre in 5–6 gal. gave better weed control in 5 varieties of pea than dinitros. A comparison of MCP amine, MCP sodium salt and 2,4-D amine was made by pre-emergent applications at 2½, 5 and 7½ oz. each to 5 in. high peas. Very little difference was noted between the 2 MCP formulations, though the amine at the highest rate gave some control of wild buckwheat, whereas the sodium salt did not. At the 7½ oz. rate both MCP formulations caused some temporary crop damage and delayed maturity by 3–5 days. Yield reductions due to MCP were negligible, but those due to 2,4-D, particularly at the higher rates, were significant. Against wild oats in peas IPC worked into the soil was found to be more satisfactory than TCA, and against green foxtail surface spraying with TCA was more effective.

469. Buchholtz, K. P.
Some factors affecting the tolerance of peas to MCP.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, p. 26.

In treating peas with MCP in Wisconsin, it was found that the amine or sodium salt preparations are less hazardous than the ester preparations, and that diluted sprays are less injurious than concentrated sprays. On the basis of available data it appears that MCP is a promising herbicide for the control of annual broad-leaved weeds when applied in the amine or sodium salt forms to peas 6 in. high at rates of no more than 0·25 lb. per acre in spray volumes of not less than 20 gal. per acre. More tolerant weeds might be treated under similar conditions with up to 0·5 lb. of MCP per acre, but considerable delay in maturity and some reduction in yield would probably result. [See also *H.A.*, 23: 2980, and above, 468.]

470. Miller, M. W.
Pea weed control.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, pp. 26-7.

MCP sprays at ⅛ lb. (acid equivalent) in 25 and 12 gal. per acre gave good weed control without causing injury to peas or having any significant effect on their maturity.

471. Seely, C. I.
Wild oat control in dry peas.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, pp. 27-8.

For satisfactory growth of dry peas in the Pacific Northwest control of wild oats [*Avena fatua*] is of the greatest importance. Tests have shown that this can be achieved best by spraying IPC at 4 lb. per acre just prior to seeding in the spring and thoroughly working the material into the soil to a depth of at least 3 in. and preferably 6 in. Application of the non-emulsifiable form of IPC in diesel oil has generally given better results at a lower cost than the other forms tested. Dry applications have been less satisfactory than sprays.

472. FRENCH, F. L.
Weeds in tobacco seedbeds. Methyl bromide fumigation.
J. Dep. Agric. Vict., 1954, **52**: 327-31, illus.

Gas-proof frames were used in fumigation of tobacco seed beds. Methyl bromide at 1 lb. per 11 square yards gave efficient weed control. Seed was safely sown 2 or 3 hours after the removal of the covers.

Herbicides and apparatus.

(*See also* 69, 402, 492b, c, f, h, j, k, l, 764.)

473. WESTMORELAND, W. G., AND KLINGMAN, G. C.
Chemicals for weed control.
Ext. Circ. N.C. agric. Ext. Serv., **378,** 1953, pp. 19.

The authors consider briefly in turn 2,4-D, its sodium salt, amine salts and esters, 2,4,5-T and mixtures with 2,4-D, ses (crag herbicide 1, being sodium 2,4-dichlorophenoxyethyl sulphate), MCP (2-methyl, 4-chlorophenoxyacetic acid), ammate (ammonium sulphate), dinitro compounds, PCP (pentachlorophenol), IPC (isopropyl phenyl carbamate), CIPC (isopropyl-N-(3-chlorophenol carbamate)), sodium chlorate, boron products and CMU (3 (p-chlorophenyl)-1, 1-dimethylurea), their outstanding properties and uses.

474. FOSTER, J. R.
Newer chemicals for weed control.
Proc. 7th west. Canad. Weed Control Conf. 1953, Edmonton, Alberta, pp. 64-9.

The author summarizes results obtained with 11 so-called newer herbicides by various research workers, mainly in Western Canada.

475. VIDME, T.
Forsøk med natriumklorat II. Om faktorer som har innflytelse på virkningen og ettervirkningen av natriumklorat som ugrasdreper. (**Experiments with sodium chlorate II.*) On factors affecting the action and residual effect of sodium chlorate as a weed killer.**) [English summary, pp. 2.]
Meld. Norg. LandbrHøgsk., 1954, **34**: 287-343, bibl. 75, illus.

Although the crop plants studied in extensive laboratory and field trials were chiefly cereals and potatoes, the results are a contribution to our general knowledge of the herbicidal action of sodium chlorate. It was shown, for instance, that injuries to crop plants were greatly reduced by heavy applications of calcium nitrate in spring before planting. The effect of soil type and other soil factors on residual toxicity was also investigated. Data are given on the dosage of sodium chlorate required to kill individual weed species.

---

* For Part I see *Meld. Norg. LandbrHøgsk. Jordkulturfors.* **26,** 1943.

476. ORTH, H.
Zur Inaktivierung wuchsstoffhaltiger Herbizide durch Adsorption an Kohle. (**The inactivation of hormone herbicides by adsorption on charcoal.**) [English summary, 16 lines.]
Z. PflKrankh., 1954, **61**: 385-96, bibl. 11, illus.

In germination tests on black filter paper the growth-inhibiting action of hormone herbicides was partially neutralized. Filtration through activated carbon considerably reduced the toxicity of 0·1–0·2% solutions of 2,4-D, the adsorptive action being most pronounced in the case of ester preparations. One gram of activated carbon proved sufficient to neutralize 100 cc. of a 0·2% 2,4-D+2,4,5-T ester emulsion. For the cleaning of sprayers containing remnants of hormone herbicides the adsorption method was found to be more efficient than any other method so far recommended. In glass-house and field trials germinating seeds, previously dusted with activated carbon, were protected from damage due to residues of hormone herbicides in the soil and no adverse effects were observed in the further development of the plants. A method of treating the seeds has been developed which makes it possible to sow peas, carrots and onions on the day following the soil application. Both weed counts and estimates of labour requirements and yields showed the treatment to be economically feasible. [Translation of author's German summary.]—Inst. f. Gemüsebau u. Unkrautforsch., Biol. Bundesanst. f. Land- u. Forstwirtsch.

477. CRAFTS, A. S.
Absorption and translocation of herbicides.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, p. 28.

In order to kill roots of plants following spray application to the foliage a herbicide must penetrate the cuticle, move into the mesophyll cells of the leaf or stem, migrate to the phloem and there move to the parts below ground. Studies with radioactive 2,4-D on beans, cotton, cucumber and barley show that this compound in the acid form penetrates the cuticle, moves to the phloem and there moves with foods in the plant. Tests on wild morning glory prove that radioactive 2,4-D is readily absorbed by the cotyledons and young leaves and transported to the roots of small seedlings. In old plants in the field translocation in actively growing plants was downward from basal leaves, upward from tip leaves, and in both directions from leaves in the middle of the stem. Movement in horizontal roots occurred as readily as in vertical ones.—Univ. Calif., Davis.

478. WEINTRAUB, R. L.
Metabolism of 2,4-D by microorganisms and higher plants.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, pp. 6-7.

Microorganisms: Although it has been abundantly shown that the detoxication of 2,4-D in soils is due primarily to microbial action, knowledge of the mechanism of breakdown is incomplete. Experiments indicate that the molecule may not be degraded completely to CO_2 and water.

Higher plants: The few species so far examined appear to have only limited capacity to metabolize the 2,4-D molecule. It is uncertain whether the physiological action of 2,4-D is related to the transformations which it undergoes. The only decomposition product that has been identified is CO_2.

479. WORT, D. J., AND SEXSMITH, J. J.
Foliar application of sprays and dusts containing major and minor elements with and without 2,4-D.
Proc. 7th west. Canad. Weed Control Conf. 1953, Edmonton, Alberta, pp. 51-60.

In these preliminary plant nutrition-herbicidal experiments at various research centres in Canada, cereals, sugar beet and flax were used as test plants, and in future trials at the University of B.C. additional species are to be included.

480. MAHLSTEDE, J. P., AND DENISEN, E. L.
Analogs of 2,4-dichlorophenoxyethyl sulfate.
Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953, Kansas City, Mo, pp. 60-1.

Sesin (2,4-dichlorophenoxyethyl benzoate), Natrin (Na 2,4,5-trichlorophenoxyethyl sulphate), and Fenox (bis(dichloro) phenoxyethyl oxalate).

481. FROST, A. M., AND LANGRIDGE, D. F.
Hormone sprays and bees.
J. Dep. Agric. Vict., 1954, **52**: 375-6.

Both the amine and ester of 2,4-D were applied in normal concentrations to flowering capeweed. No ill-effects were observed on bees working the flowers or on brood in the hives.

482. FABRICATORE, J. A.
Azione a distanza di un diserbante. **(Drift damage from a herbicide.)**
Ital. agric., 1954, **91**: 549-51, bibl. 4, illus.

The morphological and histological changes in lettuce caused by the use of Erbitox, a selective herbicide based on 2,4-D, on a field of wheat about 30 metres away are noted.

483. GEORGE, D. K., AND OTHERS.
Relative herbicidal and growth-modifying activity of several esters of N-(3-chlorophenyl)-carbamic acid.
J. agric. Food Chem., 1954, **2**: 990-5, bibl. 4.

It was found possible to influence the activity of the commercial herbicide CIPC profoundly by substitution in the alkyl portion of the chain to form another ester.

484. BARRONS, K. C.
Dalapon as a grass controlling herbicide.
Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953, Kansas City, Mo, pp. 57-8, bibl. 2.

Controlled laboratory investigations have proved that Dalapon (a,a-dichloropropionic acid) is actively absorbed and translocated by living grass foliage. It is also absorbed by roots following soil applications. At present the material is available commercially only for industrial areas, but experiments on post-emergence selective control of annual grasses in certain crops including beets show promise.

485. BEHRENS, R.
Amino triazole.
Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953, Kansas City, Mo, p. 61.

In screening tests peas, lima beans, cucumber and snap beans were quite tolerant to pre-emergence applications of 8 and 16 lb. of ATA per acre. Control of broad-leaved weeds by the material is reported to be very good.

486. HAUN, J. R., AND PETERSON, J. H.
Translocation of 3-(p-chlorophenyl)-1, 1-dimethylurea in plants.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, pp. 28-9.

Tomato plants 35 days old were grown in nutrient solutions containing 0·25 ppm of C^{14} ring-labelled CMU for from 2 hrs to 6 days. Radioautograms showed that an appreciable amount of C^{14} was present throughout the aerial portion after exposure for 2 hrs to the CMU treatment. The concentration of C^{14} in the roots of the tomato increased very gradually throughout the period of treatment, whereas the concentration in the aerial parts increased quite rapidly. The same trends were noted in further experiments with older plants. When tomato foliage was treated with labelled CMU, radioautograms showed very little C^{14} below the area of application. These experiments repeated on monocotyledonous plants confirmed that translocation is very rapid upwards but does not occur downwards. In crops treated with pre-emergence applications of CMU very little translocation occurred.

487. SHERBURNE, H. R., AND FREED, V. H.
Soil effects on herbicides, adsorption of 3(p-chlorophenyl)-1, 1-dimethylurea as a function of soil constituents.
J. agric. Food Chem., 1954, **2** 937-9, bibl. 9.

A study of the amount of CMU adsorbed by various soils showed that organic matter has a considerable affinity for CMU. Higher doses of CMU may be required on soils high in organic matter or with deposits of vegetation or sawdust on the surface than on soils containing less organic matter.

488. PAGE, G. E.
Sprayers for experimental plots.
Agric. Engng St. Joseph, Mich., 1954, **35**: 498-9, bibl. 2, illus.

For experimental application of herbicides a sprayer for use in the greenhouse and a small field plot sprayer were developed at Oregon State College. Both the greenhouse apparatus enclosed in a booth and the plot equipment mounted on a push cart are illustrated and described.

489. STEPHANSON, B. T.
Coverage obtained with boom and boomless sprayers.
Proc. 7th west. Canad. Weed Control Conf. 1953, Edmonton, Alberta, pp. 1-4.

Tests were conducted at the University of Alberta to determine the volume distribution characteristics over the spray swath from various sprayer models under still air conditions. It would appear that the new models of boomless sprayers give equal or better coverage than the models of boom sprayers tested. Effects of distortion by wind and the wide range of droplet size in the boomless sprayers have yet to be studied.

490. S[tory], C. G.
Knapsack spray improvement.
Cane Grs' quart. Bull., 1954, **18**: 28, illus.

Contact weed spraying with a Rega knapsack can be expedited and made less fatiguing by increasing the distance between the centres of the 2 spray nozzles from the standard 1⅞ in. to 8⅞ in. This conversion for which instructions are given, increases the ground coverage from 18 ins. to at least 3 ft when the nozzles are held at the normal height of 30 ins.

491. Paterson, J. J.
The effects of some weed and insect sprays on spray rig materials.
Proc. 7th west. Canad. Weed Control Conf. 1953, Edmonton, Alberta, pp. 21-3, 20.

A table is given showing the effect of 6 herbicide and 4 insecticide solutions on 32 spraying equipment materials after 7 weeks testing.—Univ. of Manitoba.

Noted.

492.

a Carlson, A. E.
Control of woody plants using "ammate" weed and brush killer and other non-growth regulator herbicides.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, pp. 15-16.

b Derscheid, L. A.
Recent findings with 4-chlorophenoxyacetic acid and 3,4-dichlorophenoxyacetic acid.
Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953, Kansas City, Mo, pp. 59-60.

c Evans, W. C., and Smith, B. S. W.
The photochemical inactivation and microbial metabolism of the chlorophenoxyacetic acid herbicides.
Biochem. J., 1954, **57** (4): xxx, bibl. 8.

d Hattingh, I. D.
Control of witchweed.
Fmg S. Afr., 1954, **29**: 316-18, illus.
Striga lutea, a parasite on grasses and cereals.

e Ogle, R. E., and Warren, G. F.
Activity and fate of herbicides in soils.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, pp. 21-2.

f van Overbeek, J., and Blondeau, R.
Mode of action of phytotoxic oils.
Weeds, N. York, 1954, **3**: 55-65, bibl. 24.

g Petersen, H. I., and Ravn, K.
Årsoversigt for Statens Ukrudtsforsøg 1953. **(Annual Report of the Danish Institute for Weed Research for 1953.)** [English summary, pp. 2¼.]
Tidsskr. Planteavl, 1954, **58**: 177-84.

h Ries, S. K.
Studies on the selective mechanism of chloro IPC (isopropyl N-3-chloro- phenylcarbamate.)
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, pp. 22-3.

i Rivals, P.
Sur deux graminées préjudiciables aux cultures de canne de la Réunion. **(On two grasses injurious to cane crops in Réunion.)**
Rev. agric. Réunion, 1954, **54**: 78-80.
Arundinella bengalensis and *Echinochloa colonum* may cause trouble in the year of planting.

j Shaw, W. C., Swanson, C. R., and Linder, P. J.
The relation of structural configuration to the herbicidal activity of the carbamates.
From abstr. in *Proc. 10th annu. Mtg N. centr. and Abstr. Paps 1st nat. Weed Control Confs 1953*, Kansas City, Mo, pp. 7-8.

k Sorenson, P.
Determination of 2,4-dichlorophenoxyacetic acid, 2,4,5-trichlorophenoxyacetic acid, 2-methyl-4-chlorophenoxyacetic acid, and 4-chlorophenoxyacetic acid.
Analyt. Chem., 1954, **26**: 1581-5, bibl. 24.
Specific methods proposed.

l Wood, H. E.
The relative importance of weed control chemicals used in Western Canada.
Proc. 7th west. Canad. Weed Control Conf. 1953, Edmonton, Alberta, pp. 79-81.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 64, 66, 67, 68, 73, 77, 86-89, 96, 101, 274, 279, 360, 363, 398, 1135, 1139, 1148, 1152, 1158, 1160, 1168, 1179.)

493. (Cochran, F. D., and others.)
New vegetable varieties. List I.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 503-25.

This list of 187 new vegetable varieties introduced by North American federal and state institutions between 1936 and 1954 has been compiled by the Committee on Vegetable Breeding and Varieties of the American Society for Horticultural Science. The information given for each variety includes date and source of introduction, parentage, characteristics, disease resistance if any, region of adaptation and reference to published report where available.

494. Philipp, F.
Das österreichische Zuchtbuch—Sektor Gemüsebau. **(The Austrian variety register—Vegetable section.)** [English, French and Spanish summaries.]
Mitt. Klosterneuburg, Ser. B, 1954, **4**: 187-230, bibl. 32, illus.

The aim of the Austrian variety register is to evaluate varieties of horticultural and agricultural plants submitted for testing by seed firms. The author surveys the situation since the law protecting breeders' rights was enforced in 1946 and its possible effects, with special reference to vegetables.

495. Service de l'Horticulture, Rabat.
La terre Marocaine. Numéro spécial sur le Maroc maraicher suivi du calendrier de la production maraichère. (**Morocco. Special number on Moroccan market gardening with a production calendar**), 1950, pp. 134.

Most of the vegetable crops grown in Morocco are for home consumption, but there is a certain export trade for which very early or late season crops are grown. Tomatoes head the list of crops exported in the first 9 months of 1949, with 232,000 quintals [1 q. = 100 kg.] marketed; 146,000 quintals of potatoes and 70,000 quintals of onions were exported. Other important export crops were gourds, beans, peppers and peas.

496. European Plant Protection Organisation.
Danger from seed-borne diseases. A practical approach to the problem of international safeguards. Report of the working party on seed-borne diseases (Paris, 2-3 July, 1954). [French and English.]
[*Publ.*] *Eur. Plant Prot. Org.* [*E.P.P.O.*], 1954, pp. 31.

The working party was formed to consider certain international problems of seed-borne diseases. In the report the necessity for testing for disease resistance as well as for purity and germination is stressed. Appendix I lists important seed-borne diseases which are either not yet present or not widely distributed in Europe. The list includes lettuce mosaic, bacterial wilt of *Phaseolus* spp. (*Corynebacterium flaccumfaciens*), bacterial canker of tomato (*Corynebacterium michiganense*), common bean blight (*Xanthomonas phaseoli*), bacterial blight of pea (*Pseudomonas pisi*), bacterial spot of tomato and pepper (*Xanthomonas vesicatoria*) and ramularia leaf disease and stunt (wilt) of cyclamen (*Ramularia cyclaminicola*). Appendix II summarizes information submitted to EPPO on the organization of seed testing in 23 European and Mediterranean countries and territories, and on the relation existing between seed testing stations and plant protection services.

497. Suskin, M.
The effect of display conditions upon the viability of packet seeds in California.
Bull. Calif. Dep. Agric., 1953, **42**: 120-37 [received 1954].

Ten varieties of vegetable seed were packeted and subjected to display conditions in 7 locations in California, and their viability was then compared with that of seed not so displayed. Some of the seeds were treated with Arasan and this appeared to have little effect on germination quality. Reduced viability of seeds in displayed packets indicates the desirability of protecting packets as much as possible from high humidity and high temperature. [See also *H.A.*, **24**: 2633.]

498. Martin, W. J., and Atkins, J. G.
Results of vegetable seed treatments in Louisiana.
Plant Dis. Reptr, 1954, **38**: 348-9.

Results are given of treating seed of named varieties of beet, carrot, eggplant, pea, mustard, capsicum, radish, spinach and tomato with the following materials in the winter of 1952/53: Arasan, dow 9B, orthocide 75, spergon, semesan, thiram, vancide 51 ZW and L.S.D. 5 and 1%. They vary very greatly.—La agric. Exp. Stat., Baton Rouge.

499. Wallen, V. R.
Treatment of vegetable seed for improved emergence.
Plant Dis. Reptr, 1953, **37**: 620-2, bibl. 1.

Twenty-one different vegetables and seven different chemicals were tested. Comparative results—some of them encouraging—are tabulated.—Bot. Plant Path. Div., Ottawa. [See also *H.A.*, 24: 421.]

500. Wallen, V. R.
Dilution of panogen for vegetable seed treatment.
Plant Dis. Reptr, 1953, **37**: 623-4, bibl. 5.

Trials indicate that undiluted panogen provides the best treatment for maize, bean and radish. For tomato, cucumber and beet panogen undiluted and panogen plus an equal amount of water are equally good.—Bot. Plant Path. Div., Ottawa.

501. Ark, P. A., and Sibray, W. S.
Use of panogen drench to control damping-off in nursery flats.
Plant Dis. Reptr, 1954, **38**: 204-6.

Panogen (methyl-mercury-dicyan-diamide) showed considerable toxicity to damping-off fungi such as *Rhizoctonia solani* and *Pythium ultimum*. Owing to its slow volatility its action is prolonged. It produces no toxic effects on either seeds or plants in soil drenched with 1: 10,000 solution. Treated flats can be seeded 24 hours after the treatment. Many common species of ornamental and vegetable plants were free of damping-off when planted in a leaf mold mixture treated with panogen. [Authors' summary.]—Dep. Plant Path., Univ. Calif., Berkeley.

502. Heydecker, W.
The germination of vegetable seeds.
Univ. Nottingham Dep. Hort. Res. Rep. 1954, pp. 7-9.

Initial field investigations into seed germination were mainly concerned with sowing depths. Accurate determinations were made of optimum depths for cabbage, carrot, lettuce and onion seed in a sandy loam. The conclusions drawn were that precision in sowing depth helps to obtain a predictable stand of plants, and that the depth should be measured, not guessed. Laboratory investigations showed that thiram coatings improved the germination of some seeds, but steam sterilization of soil was more effective. Soil compression below the seed accelerated germination, but compression after sowing frequently depressed it, especially with deep sowing. The optimal soil moisture for germination was slightly below field capacity; progressive drought retarded and later prevented germination of lettuce, onion, carrot and cabbage in that order.

Atmospheric proportions of 8 N_2: 1 O_2: 1 CO_2 and 8 N_2: 1·5 O_2: 0·5 CO_2 considerably reduced the germination speed of cabbage and lettuce. Large carrot seed gave a better plant stand than small seed for an equal number of seeds sown.

503. John Innes Horticultural Institution.
Artificial illumination of seedlings.
John Innes Leafl. **11,** 2nd ed., 1954, pp. 7, 9d.

The first edition of this leaflet [see *H.A.*, 22: 3342] has now been thoroughly revised in the light of further experiments and of results obtained by growers. Detailed instructions are given for the installation and use of high pressure mercury vapour lamps for the supplementary illumination of tomato and cucumber seedlings during winter. Possible causes of failure to obtain good results are discussed. With cucumbers no problems have arisen, and by the use of mercury lamps, as recommended, growers have obtained increased gross returns of up to 4s. per plant by the end of June. With tomatoes results have been variable, the commonest causes of failure being incorrect culture of the early crop, poor temperature control, and failure to follow the recommendations. At the John Innes Institution, the use of supplementary illumination for tomato seedlings has resulted in a yield increase of ½ to 1 lb. fruit per plant in the first month of cropping for 5 years in succession.

504. Dullforce, W. M.
Recovery from the check of transplanting.
Univ. Nottingham Dep. Hort. Res. Rep. 1954, pp. 10-12.

Pricking-off at the cotyledon stage was not detrimental to the growth of lettuce seedlings in comparison with those left undisturbed, provided that injury was minimal. Growth was checked when cotyledons and/or primary roots were damaged in varying degrees, although the check was only temporary unless injury was extreme. Disturbance at transplanting of lettuces, tomatoes and cabbages was nil when soil blocks or pots were used; plants in boxes showed higher degrees of check with closer spacing, and shaking soil from the roots was detrimental. The check given at transplanting, although only temporary, caused a reduction in earliness of yield; total yield was not affected if external conditions were uniform throughout harvesting.

505. (Pew, W. D.)
Field-seeded vegetables respond to vermiculite mulch.
Mkt Grs' J., 1954, **83** (9): 26, 31, illus.

In tests at the Arizona Experiment Station the use of expanded vermiculite as a mulch has improved seedling emergence and increased the yield of many vegetable crops. When the mulch was applied as a band ½ in. deep and 1 in. wide over the seed row, total yield of autumn head lettuce was increased by 23% and yield of desirable heads by 62·5%. Vermiculite mulch has also made it possible to obtain perfect stands of broccoli and cauliflower where precision is needed in experimental work, and emergence of cantaloupes has been improved. Other growers have reported excellent results with the mulch for peppers and cotton. The insulating and moisture-holding properties of vermiculite prevent drying out and crusting of the soil and excessively high temperatures. The material can be applied with a hopper over the seed row.

506. Martin, J. P., and Jones, W. W.
Greenhouse plant response to vinyl acetate-maleic acid copolymer in natural soils and in prepared soils containing high percentages of sodium or potassium.
Soil Sci., 1954, **78**: 317-24, bibl. 4, illus.

The effect of vinyl acetate-maleic acid copolymer (VAMA) on plant growth was studied in various soils. Treatment of a sandy loam significantly increased the growth of carrot roots and doubled the growth of avocado seedlings, but did not affect tomato plants, beetroot, or orange seedlings. The growth of avocado seedlings was almost doubled after VAMA treatment of a poorly aggregated soil, but there was no significant effect of the treatment on plants growing in a well aggregated soil. Growth of sweet orange seedlings in 3 old citrus soils was not affected by VAMA treatment. The application of 0·15% VAMA to a well aggregated sandy loam low in exchangeable Na did not affect the growth of lettuce or of carrot tops; it slightly improved the growth of peach seedlings, radish tops and carrot roots, and substantially improved the growth of radish roots. In a soil containing 28% exchangeable Na the addition of VAMA increased the growth of peach seedlings, carrots, lettuces and radishes. VAMA treatment had no significant effect on nutrient absorption by radish and lettuce plants, but tended to reduce absorption of Na by peach seedlings.—Univ. Calif. Citrus Exp. Stat.

507. Reith, J. W. S.
Recent advances in fertilizer placement. I. Fertilizer placement for swedes and turnips in Scotland.
J. Sci. Food Agric., 1954, **5**: 421-8, bibl. 5.

During 1947-52 field experiments were carried out to compare broadcast and band applications of sulphate of ammonia, superphosphate, muriate of potash, 40% potash salts and 2 granular NPK fertilizers. Placement of superphosphate directly below the seed at a depth of 3–3·5 inches consistently gave the best yields. No benefit was obtained by placement of sulphate of ammonia, which might even be harmful if placed directly below the seed. Placement of muriate of potash (60% K_2O) showed no benefit or disadvantage, but with 40% potash salts broadcasting generally gave better results than placement. There was no benefit from placement of NPK fertilizer mixtures. [English trials giving somewhat different results with other crops are reported in the next abstract.]

508. Cooke, G. W.
Recent advances in fertilizer placement. II. Fertilizer placement in England.
J. Sci. Food Agric., 1954, **5**: 429-40, bibl. 14, illus.

In experiments on fertilizing horticultural crops PK fertilizers placed near the seed produced higher yields of beans and peas than the same quantities broadcast. Higher yields were obtained from placed than from broadcast complete fertilizer in experiments on swedes, spinach, lettuce, runner and broad beans, beetroot, cabbage, onions and sweet corn. A further advantage of placement is that with some vegetable crops it induces earlier maturity. Root growth of most crops was stimulated by dressings of mixed fertilizers placed near the seed. [This differs from Reith's experience in Scotland—see last abstract. See also *H.A.*, 24: 413.]

509. Maksimow, A., and Chroboczek, E.
Znaczenie mikroelementów w uprawie warzyw na glebach torfowych. **(Experiments on growing certain vegetables in muck soils with application of micro-elements.)** [English and Russian summaries pp. 3 and 4 respectively.]
Roczn. Nauk rol. Ser. A, 1954, **68**: 433-79, bibl. 22.

Spinach, red beet, carrot, onion, cabbage, cauliflower and potato were grown in the field and in pots on different muck soils treated with Mn, B, Cu and Fe, and the effects of these elements on yield and composition were noted and are discussed.

510. Toth, S. J., and Romney, E. M.
Manganese studies with some New Jersey soils.
Soil Sci., 1954, **78**: 295-303, bibl. 3, illus.

Including Mn analyses of carrots, beetroots, peppers, spinach, cabbage, lettuce, cauliflower, onions and several weeds.

511. Viets, F. G., Jr., Boawn, L. C., and Crawford, C. L.
Zinc contents and deficiency symptoms of 26 crops grown on a zinc-deficient soil.
Soil Sci., 1954, **78**: 305-16, bibl. 9, illus.

In a field experiment on a Zn-deficient soil Zn deficiency was not shown by safflower, peppermint, carrots, onions, asparagus or peas. Crops showing deficiency symptoms included castor beans, field beans, lima beans, Concord grapes, hops and tomatoes. Zinc sulphate applications decreased or prevented the symptoms. In a pot experiment beans absorbed significantly less native Zn than barley, oats and soybeans. The uptake of applied Zn, however, was the same for all crops.

512. Baljabo, N. K., and Blinov, M. I.
The irrigation regime of vegetable crops in arid regions. [Russian.]
Zemledelie, 1954, **2** (6): 73-7.

When vegetables are grown in arid regions on degraded soils, the rate of irrigation water applied should be increased to 800 cub.m. per ha to increase the utilization coefficient of water and obtain high yields. The number of applications required, methods of application, water penetration, placement of side dressings and the importance of the depth of ground water are discussed.

513. Fiščenko, G. I.
Irrigation of vegetables by the method of moistening the root-inhabiting layer of the soil. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1954, **19** (1): 41-8, illus.

A tractor-mounted unit is used for applying water into the zone of maximum root distribution. The water is pumped into a pipe laid along the rows and provided with jets which are forced into the soil to a depth of 30–40 cm. This method of irrigation is shown to be very economical and is suitable for vegetables and some other crops, particularly on uneven ground. Organo-mineral fertilizers can be applied with the irrigation water and the system can safely be used for distributing sewage water since it is deposited under the soil surface.

514. van Dam, J. G. C.
Onderzoek naar de zoutgevoeligheid van de belangrijkste vollegronds groentegewassen. **(Research on the salt susceptibility of the principal outdoor vegetable crops.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1954, **17**: 811-20, bibl. 7, illus.

Results are given of studies started in Holland in 1953 on the susceptibility of vegetables to soil salinity. Crop yield was shown to depend, not only on the actual salt concentration in the soil, but also on climate, soil structure and variety. On saline soils there was a higher incidence of beetroot "fire", anthracnose in spinach (*Colletotrichum spinaciae*), and blackrot of carrot (*Alternaria radicina*). Seed disinfection is important on saline soils. Critical soil salt concentrations and short cultural notes are given for the principal vegetable crops.

515. Newhall, A. G.
Chloropicrin aerosol treatment of compost piles.
Plant Dis. Reptr, 1954, **37**: 625-7.

The application of chloropicrin as an aerosol under pressure containing 50% methyl chloride as a propellant to a compost heap under a tarpaulin proved successful in preventing post-emergence damping off in vegetable seeds. The lowest satisfactory dosage rate in the tests on the basis of weed seed and damping off control is considered to be 1½ lb. per cubic yard of soil which is the equivalent of ¾ lb. of straight chloropicrin hitherto advocated in the injection method. Soil temperature should be above 60° F.—N.Y. Coll. Agric., Ithaca.

516. Keener, P. D.
Virus diseases of plants in Arizona. I. Field and experimental observations on mosaics affecting vegetable crops.
Bull. Ariz. agric. Exp. Stat. **256,** 1954, pp. 38, bibl. 9, illus.

The symptoms, transmission and control [sanitary precautions] of vegetable mosaic viruses in Arizona are discussed. The mosaic occurring in lettuces was shown to be distinct from cucumber mosaic, and a certain amount of seed transmission of this virus was found. The pea aphid (*Macrosiphum pisi*) and *Myzus persicae* were vectors of the yellow-mottle mosaic found in squash seed; seed transmission of this virus was shown to occur in both squash and melon.

517. Kassanis, B.
Heat-therapy of virus-infected plants.
Ann. appl. Biol., 1954, **41**: 470-4, bibl. 3, illus.

Virus-free plants were produced from parents systemically infected with the following five viruses: tomato bushy stunt, carnation ring spot, cucumber mosaic, tomato aspermy and *Abutilon* variegation. The leaves formed while the infected plants were kept at 36° C. were free from symptoms, and test plants inoculated from these remained uninfected. When cuttings were taken from the infected plants at the end of the treatment most grew into healthy plants. The treated plants themselves usually developed symptoms after varying lengths of time at 20° C., but some, that before treatment were infected with tomato aspermy, cucumber mosaic or *Abutilon* variegation viruses, remained permanently healthy. The same method failed to cure plants infected with tomato spotted wilt, potato virus X and tobacco mosaic virus, although it decreased their virus content. Heat-therapy seems not to be correlated with the thermal inactivation end point of the virus *in vitro*. [Author's abstract.]—Rothamsted exp. Stat.

518. Jacks, H., and others.
Vegetable therapeutant trials 1952-1953. Pests and diseases of beans, cabbage and celery.
N.Z. Comm. Gdnrs' J., 1954, **9** (10): 5-6; **9** (11): 3-4, bibl. 2.

Bean rust diseases (*Uromyces appendiculatus* and *U. fabae*) were successfully controlled in the glasshouse by all the fungicides used but the best control of *U. fabae* in the field was obtained by a spray of lime-sulphur and colloidal sulphur. Red mite (*Tetranychus urticae*) and caterpillar (*Plusia chalcites*) on beans were both controlled in a field trial by Thiophos, Fosferno 20, and Hexone. On cabbages good control of caterpillars (*Pieris rapae* and *Plutella maculipennis*) was obtained by D-spray 50 and DDD-25 without leaving any taint; satisfactory control of aphis (*Brevicoryne brassicae*) was obtained by a Hexone spray. Celery leaf spot (*Septoria apii*) was controlled by both bordeaux mixture and Cuprox sprays; the plants were severely damaged by diphenyl sulphone sprays. [See also *H.A.*, 24: 3881 and 3933.]

519. Dorsey, C. K., and Gallegly, M. E.
A general-purpose garden pesticide.
Bull. W. Va agric. Exp. Stat. **365T**, 1954, pp. 25, bibl. 5.

During 1952 spray and dust trials were carried out on 5 types of vegetable with various combinations involving the fungicide zineb and the insecticides methoxychlor, DDT, rotenone and malathion. In trials in 1953 4 more vegetables were included and the fungicides maneb and captan were compared with zineb in combination with insecticides. After considering pest and disease control, crop yield data, costs of materials and toxicity, a zineb-methoxychlor-malathion combination is recommended as a satisfactory general purpose spray for vegetable gardens. Used as a spray a concentration of 2–2–2½ lb. per 100 gal. is suggested, and for dusting a mixture containing 3·9–5–4% active ingredients.

520. Mossop, M. C.
Report of the Chief Entomologist [Southern Rhodesia] for the year ending 30th September, 1953.
Rhod. agric. J., 1954, **51**: 275-86.

Chlordane. Soil applications of 100 mg. chlordane in emulsion per site of seed or seedling had no toxic or tainting effect on pumpkin, french bean, carrot or cabbage. *Systemic insecticides*. In trials 0·1% BFPO [hanane?] did not control *Pseudococcus filamentosus* on hibiscus and gave inconclusive results against cabbage leaf miner. *Mango scale*. Single applications of either white oil emulsion or parathion were effective against *Aulacaspis cinnamomi*. At the strengths used parathion had the longer residual effect.

521. Kunz, H.-D.
Über die innertherapeutische insektizide Wirkung des Cyanamids. **(On the systemic insecticidal action of cyanamide.)** [English summary ½ p.]
Z. PflKrankh., 1954, **61**: 481-521, bibl. 48, illus.

Experiments with *Doralis fabae* on broad bean and beet showed that cyanamide is absorbed by the roots, translocated in the plant and toxic to aphids feeding on it. From the detailed discussion on the action of the chemical it is evident that under certain conditions requiring further definition calcium cyanamide has potentialities as a systemic insecticide. Dicyandiamide proved less effective against the black bean aphid and other insect pests tested.—Univ. Göttingen.

522. Taylor, E. A.
Parasitization of the salt-marsh caterpillar in Arizona.
J. econ. Ent., 1954, **47**: 525-30, bibl. 9.

The salt-marsh caterpillar, *Estigmene acrea*, damages autumn vegetable plantings in Arizona. The insect has become more abundant since 1945, probably owing to the destruction of its 2 important parasites, *Exorista larvarum* and *Rileymyia adusta* by DDT applied to cotton, the primary host plant of salt-marsh caterpillar. Against the caterpillar, however, DDT was shown to be ineffective.

523. Saaltink, G. J., and Ticheler, J.
De bestrijding van emelten (*Tipula* spp.). **(Control of leatherjackets.)** [English summary ¼ p.]
Tijdschr. PlZiekt., 1954, **60**: 193-8, bibl. 4.

Field experiments were carried out during 1950 to 1953 with several insecticides for the control of leatherjackets. On arable land 2·5 kg. 10% BHC, 100 c.c. 25% parathion, or 1 kg. paris green per ha., each mixed with bran, gave good results. On grassland, spraying with parathion or applying a mixture of parathion and bran resulted in the largest number of dead larvae on the surface.

524. Thompson, B. D.
The removal of insecticide residues from harvested fresh vegetables.
Diss. Abstr., 1954, **14**: 747, being *Publ.* 7900 of 120 pp.

Water washing of vegetables under laboratory conditions removed up to 60% of surface residues of toxaphene and parathion depending on the surface characteristics. Detergents removed significantly more toxaphene than did water from all vegetables except tomatoes. Parathion residues were less after detergent washing than after water washing, but the differences were only significant with mustard greens. Synthetic detergents generally resulted in greater weight losses of vegetables during storage than did soap solutions or water; dilute solutions of synthetic detergents caused some apparent injury to green beans.

525. PANAFIDIN, K. A.
Means of controlling rodents in protected ground. [Russian.]
Sad i Ogorod, 1954, No. 10, pp. 35-6.

Baits of bread, grain, vegetables or green plant material treated with zinc phosphide are recommended for placing every 3–5 days in frames for the control of mice and rats. When not in use the frames should be disinfected and the straw mats dusted with BHC before storage. Enclosing dry seed of melon, watermelon, pumpkin, marrow and sometimes cucumber in a flour paste and then applying zinc sulphide also affords good protection against rodents without affecting germination. Simultaneously with vegetable sowing, oats should be sown in the corners of the frames and treated sunflower seed placed among it as bait. Rodent control in stores is also mentioned.

526. SILBERSTEIN, O.
Volatile carbonyl compounds of vegetables and their possible role in flavor.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 359-70, bibl. 12, illus.

Methods are described for the collection, separation and identification of volatile carbonyl compounds in vegetables. The results of studies on peas, onions and sweet corn are reported. The mixture of derivatives obtained from peas contained the acetaldehyde derivative as a major component. A study of freshly harvested, shelled peas indicated that steam-volatile carbonyls or their precursors accumulate very rapidly in the immediate post-harvest period, even if the peas are stored at 0° F. Blanching reduced the amount of carbonyls distillable and the rate of accumulation. The major carbonyl component obtained by distillation from onions was propionaldehyde. The important role which paper chromatography could play in work with flavouring constituents, permitting the analysis of small samples, is pointed out.—Cornell Univ., Ithaca, N.Y.

Asparagus.

(*See also* 15, 703k.)

527. GHISLENI, P. L.
Risultati di prove di concimazione localizzata all'asparago. (**Asparagus fertilizer placement trials.**) [English, French and German summaries 4, 5 and 5 lines.]
Riv. Ortoflorofruttic. ital., 1954, **38**: 345-53, bibl. 10.

Nitrate of soda and/or sulphate of ammonia were applied in various positions in fertilizer placement trials in the province of Turin in 1950/52 on the asparagus variety Primaticcio d'Argenteuil Rosa Lhérault planted out in 1948. The results showed that during the first 3 years of light picking nitrate of soda is better than sulphate of ammonia, and that it should be placed in a ring round the plants 15 cm. from the outer stems soon after the end of the cutting period.

528. ANON.
Three-in-one tool.
Mkt Grs' J., 1954, **83** (9): 30, illus.

A self-propelled asparagus picker, designed in Michigan, is described. It permits speeds as slow as $\frac{1}{4}$ mile per hour and carries 3 workers who cut the spears. The machine can be transformed into a wiggle-hoe for strawberries or a cultivator for field crops. It costs about $400.

529. KEPNER, R. A.
A mechanical harvester for green asparagus.
Mkt Grs' J., 1954, **83** (9): 8-9, 22, illus.
Asparagus harvester improved.
Calif. agric., 1954, **8** (9): 3-4, illus.

A description and illustrations are given of a new machine designed in California to harvest green asparagus spears for canning and freezing. The machine is still in the experimental stage but has had 2 seasons tests. Working on the principle of "set-level" cutting, it cuts all spears regardless of length, but very few spears shorter than $3\frac{1}{2}$ in. are recovered. Losses under the present hand-cutting methods, however, would partly offset these mechanical harvesting losses. About 90% of spears over 4 in. long are recovered undamaged. Normal operating speed is $2\frac{1}{2}$ miles per hour. One machine is sufficient for at least 80 acres and replaces 10–12 hand cutters.

Brassicas.

(*See also* 28, 34, 72, 504, 505, 508, 509, 510, 518, 543, 575, 703b, d, l, n, p.)

530. RAPHAEL, T. D.
Cauliflowers—notes on cultivation, quality and strains.
Tasm. J. Agric., 1954, **25**: 221-9, illus.

General considerations with regard to quality, variety and strain in cauliflowers are discussed in relation to their commercial importance, and observations are made on the maturing periods of different varieties and groups grown at Summerleas Horticultural Station during the past 6 years. [From author's summary.]

531. MOORE, J. F., AND ANSTEY, T. H.
A study of the degree of natural selfing in green sprouting broccoli (*Brassica oleracea* L. var. *Italica* Plenck.), a normally cross-pollinated crop.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 440-2, bibl. 3.

A higher proportion of selfing was found in Green Sprouting Broccoli than was expected. The average for five locations, where one tester plant was grown with eight normals, was 50%, and at locations with one tester and one normal 76·5% selfing was found. If such a high degree of selfing occurs in seed fields, plants selected in commercial broccoli acreage may be several generations inbred. This would explain the high degree of uniformity of progeny from selected plants in a breeding program. [Authors' conclusions.] —Wash. Exp. Stat., Puyallup, and Exp. Fm, Agassiz, B.C.

532. AIDA, H., AND SHIRAI, M.
Studies on the cultivation of spring chinese cabbages. [Japanese, with English summary $\frac{1}{2}$ p.]
Bull. hort. Sect. Kanagawa agric. Exp. Stat., 1953, No. 1, pp. 14-20, bibl. 10, illus.

Trials in 1948/51 showed that (1) varietal differences in rate of bolting were considerable when sowing was done direct in the field; (2) flower buds differentiated when the minimum temperature was less than 12° C.;

(3) the best direct sowing date was late March to early April when temperatures commonly average 14° C., bolting rate was greater with earlier sowing and losses through diseases and pests were greater with later sowing; (4) in general hotbed sowing gave higher yields than direct sowing, but (5) a hotbed period of less than 20 days resulted in early flower bud differentiation and stalk growth, reduced yield and loose heads.

533. Garrard, A.
The effects of β-indolylacetic acid on the germination and root growth of certain members of the Cruciferae.
New Phytol., 1954, **53**: 165-76, bibl. 26.

Studies made on the percentage germination and subsequent root growth of 8 members of the Cruciferae indicated that IAA varied in its action according to the species (or variety) used and the concentration of the auxin. The effect on germination was generally inhibitory, although with radish it was unaffected and with some other species it was either unaffected or even stimulated by the lowest concentrations used. The effect on subsequent root growth was not necessarily the same as that on germination. Inhibition of root growth was general irrespective of whether germination had been stimulated, inhibited or unaffected.—Univ. Malaya, Singapore.

534. Lazarev, N. M., and Kondratjev, V. N.
The use of the bacterial fertilizer AMB for raising seedlings on peat and in peat-mould pots. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1954, **19** (1): 20-4, illus.

The addition of 1 part of AMB to 6 parts of peat used for pots improved the growth of cabbage seedlings and increased ultimate yields. In frames peat treated with AMB produced better transplants than the ordinary frame soil.

535. Neenan, M., and Goodman, O. G.
Varietal susceptibility of brassicas to molybdenum deficiency.
Nature, 1954, **174**: 972-3, bibl. 2, illus.

During 2 years' observations on several plots cauliflower plants of the varieties Cambridge No. 5, 6 and 7 showed severe symptoms of molybdenum deficiency under conditions under which other varieties of cauliflower and of several other brassica crops were only slightly to moderately affected or remained healthy. The soil on which the trouble occurred had a level of available Mo in the region of 0·14 p.p.m. A new symptom of Mo deficiency in cauliflower, the formation of bell-shaped leaves, is described and illustrated. The level of Mo at which particular varieties of brassicas become affected by whiptail is under investigation.—Johnstown Castle agric. Coll., Wexford, Ireland.

536. Agarwala, S. C., and Hewitt, E. J.
Molybdenum as a plant nutrient. III. The interrelationships of molybdenum and nitrate supply in the growth and molybdenum content of cauliflower plants grown in sand culture.
J. hort. Sci., 1954, **29**: 278-90, bibl. 20, illus.

Cauliflower plants, variety Majestic, were grown in sand cultures at low and high nitrate levels, and 8 levels of molybdenum. Whiptail symptoms developed with high nitrate supply and 0·00005 p.p.m. Mo. Interveinal tissue breakdown in young leaves, which preceded whiptail, was associated with an apparent loss of the middle lamella in cells in the affected area. Blue granules developed in leaves of plants given excess Mo (19·2 p.p.m.). High nitrate supply increased the Mo requirement and increased growth at the most acute Mo deficiency level. It also increased the Mo content at high Mo levels. Young leaves contained more Mo at deficiency levels, and less at normal to excess levels than old leaves.—Long Ashton Res. Stat.

537. Agarwala, S. C., and Hewitt, E. J.
Molybdenum as a plant nutrient. IV. The interrelationships of molybdenum and nitrate supply in chlorophyll and ascorbic acid fractions in cauliflower plants grown in sand culture.
J. hort. Sci., 1954, **29**: 291-300, bibl. 12.

Cauliflower plants were grown in sand cultures at high and low nitrate levels, and 8 levels of molybdenum. At the 0·005 p.p.m. Mo level there was a marked decrease in the chlorophyll content of mature leaves. Chlorophyll in young leaves was less affected by Mo status. The ascorbic acid content of all leaves increased with the Mo level up to 0·0005 p.p.m. In stems the ascorbic acid content was less, but showed a similar variation. Curds and roots contained very little ascorbic acid. High nitrate treatment usually resulted in a decreased ascorbic acid content. The dehydroascorbic acid/ascorbic acid ratio was least at intermediate Mo levels.

538. Campbell, L.
Fungicidal control of club root of cauliflower.
Plant Dis. Reptr, 1954, **38**: 283.

Among many treatments tested to control club root, including the use of ferbam, thiram, captan and streptomycin as drenches and the mixture of 7 different fungicides with the soil, the only one that gave substantial reduction in disease ratings and large increases in yields as compared with the control was the rototilling into the soil to a depth of 4–6 inches, in strips about 15 in. wide, one week before planting, of Mathieson 275 (pentachloronitrobenzene) at the rates of 20, 40 and 60 lb. active ingredient per acre. An additional benefit indicated is the control of annual weeds. This material has, however, not yet been approved by the Pure Food and Drug Administration and cannot therefore yet be recommended for use on food crops.

539. Davis, A. C., Swenson, K. G., and Patterson, M. E.
Cabbage maggot control in late cabbage.
J. econ. Ent., 1954, **47**: 475-9, bibl. 4.

At Geneva, New York, 4 insecticides were tested as broadcast soil treatments for the control of cabbage maggot [*Hylemyia brassicae*] in direct seedings of cabbage in 1950 and radish in 1953. Aldrin, dieldrin and heptachlor gave satisfactory results, chlordane was less effective. Cabbage yields were not correlated with root injury. When the residual toxicity of the 4 insecticides was tested in cabbage and swede plantings in 1951 on land treated in 1950, no satisfactory control was obtained, but dieldrin at 8 lb. per acre in cabbage and aldrin and dieldrin at 8 lb. per acre in swedes significantly reduced injury. In trials on methods of application, seed furrow treatment appeared most promising.

540. Hervey, G. E. R., and Swenson, K. G.
Effectiveness of DDT for cabbage caterpillar control in Western New York: 1944 and 1953.
J. econ. Ent., 1954, **47**: 564-7, bibl. 9.

Data are presented showing the degree of control of the imported cabbage worm, *Pieris rapae*, and the cabbage looper, *Trichoplusia ni*, obtained with DDT dusts. The cabbage worm was not so susceptible to DDT in 1953 as in 1944, but there is no evidence for assuming that it is now DDT-resistant. The cabbage looper does appear to have acquired a considerable degree of DDT-resistance.

541. Lieberman, M., and Hardenburg, R. E.
Effect of modified atmospheres on respiration and yellowing of broccoli at 75 degrees F.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 409-14, bibl. 9.

When modified atmospheres containing 10, 5, 2·5, or 1% oxygen were flushed over broccoli tissue at 75° F. for 3 days, respiration as determined by carbon dioxide evolution was materially reduced. Nitrogen atmospheres caused a decided reduction in respiration and after 2 days injury to the tissue resulted. In sealed systems containing initial concentrations of 10, 5, 2·5, or 1% oxygen, respiration was very rapidly reduced and injury to the tissue occurred sooner than in the flushed systems. In almost all the sealed systems the oxygen supply was dissipated after 1 day. Yellowing of broccoli was completely inhibited by an oxygen-free atmosphere even in the absence of carbon dioxide. Flushing broccoli with an atmosphere containing 1% oxygen partially inhibited yellowing, and had about the same effect as an atmosphere containing approximately 7 to 22% carbon dioxide and 10 to 21% oxygen. The data presented suggest that the emanation of ethylene by the tissue causes the yellowing of broccoli. [Authors' summary.]—Plant Ind. Stat., Beltsville, Md.

Celery and celeriac.

(*See also* 518.)

542. Geraldson, C. M.
The control of blackheart of celery.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 353-8, bibl. 14, illus.

Blackheart, a physiological disorder of celery, can be completely controlled by applications of a calcium solution directly to the heart of the plant. Even though the substrate contains adequate amounts of calcium, blackheart may occur in severe form as the effect of one or more factors influencing the movement of this element from substrate to point of assimilation. The results of chemical analysis of the heart tissue support the contention that a deficiency of calcium in the growing tip may be a fundamental cause of blackheart. [Author's summary.]—Gulf Coast Exp. Stat., Brodenton, Fla. [For very similar article see *H.A.*, 24: 3823.]

543. Ratvik, H., and Østeby, A.
Planting av kål og selleri. **(The planting of cabbage and celeriac.)**
Gartneryrket, 1954, **44**: 692-708, illus.

The planting of cabbage and celeriac was the subject of a time and motion study comparing tools and methods. The detailed discussion of operations and implements is supported by photographic strips. Diagrams illustrate calculations of the time needed for planting under a variety of conditions. Machine planting is also briefly considered.—Inst. Management and agric. Econ., agric. Coll., Norway.

544. Hahn, P.
Die Ertragsschwankungen der Selleriesorten und einige Ursachen. **(Fluctuations in the yield of celeriac varieties and some of their causes.)**
Dtsch. Gartenb., 1954, **1**: 289-92.

Leaf blight (*Septoria apii*), late planting (i.e. later than May) and insufficient soil moisture are the main factors which depress celeriac yields in Eastern Germany. Remedies are suggested.

Cucurbits.

(*See also* 503, 517, 651, 703e, j.)

545. Wall, J. R.
Interspecific hybrids of Cucurbita obtained by embryo culture.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 427-30, bibl. 3, illus.

Flat seeds resulting from interspecific hybridization within the genus *Cucurbita* often contain viable embryos. Embryo culture has been applied to F_1 hybrid seeds of the cross *C. pepo* × *C. moschata* and reciprocal with considerable success. A hybrid population of over 40 plants has been obtained, some from embryos as small as 3 mm. in length, and these plants developed into vigorous individuals. [Author's summary.]—Cornell Univ.

546. Anon.
New southern watermelon looks like a plant breeder's dream.
Agric. Res., 1954, **3** (4): 12.

The variety Charleston Gray is resistant to anthracnose and fusarium, is scald-free, and gives heavy yields. Its hard rind allows it to travel well, and it is relatively free from hollow-heart, white-heart and gourd-neck effects.

547. Capinpin, J. M., Rodriguez, V. D., and Odejar, J. G.
Behavior of squash chimeras.
Philipp. Agric., 1953, **37**: 258-72, illus.

Two types of Philippine squash chimeras, when propagated sexually and asexually, gave 4 distinct phenotypic classes of fruit with regard to variegation or fruit banding. Pruning of the Variegated and Elongated Green forms of squash chimera either before or after pollination tended to decrease the proportion of staminate to pistillate flowers, or to increase the number of the latter. The percentage of successful pollinations was slightly higher for those plants whose tips were pruned before pollination. The pruning of terminal shoots of squash did not materially affect the abscission of flowers and fruit. Mechanical treatment increased the number of fruits formed.

548. Ivanoff, S. S.
Measuring shipping qualities of watermelons according to Snowden's method.
J. Hered., 1954, **45**: 155-8, bibl. 7, illus.

The ability of watermelon varieties to stand shipment depends on the "toughness" of the rind. "Toughness" seems to consist of two equally important and independently inherited components, namely, hardness and resiliency. The method of measuring toughness described consists in bending a thin strip of rind into an arc until it breaks. The degrees of arc reached provides a measure of relative shipping ability of the melon. It is suggested that the problem of shipping qualities in other fruits should be re-examined with respect to both hardness and elasticity of tissues.—Miss. agric. Exp. Stat., State College.

549. Shimokawa, M., and Ono, H.
Studies on the forcing of cucumber. I. Culture in vinyl film tunnels. [Japanese, with English summary ¾ p.]
Bull. hort. Branch Kanagawa agric. Exp. Stat., 1954, **2**: 33-40, illus.

The use of tunnels covered with vinyl film permitted the planting out of cucumbers at the beginning of April instead of early May, advanced the start of harvesting by 10 days and increased yield by 175%.

550. Junges, W.
Erhöhung der Vitalität von Gurkensaatgut durch Vorbehandlung des Saatgutes mit Wärme und Feuchtigkeit. **(Heat and moisture treatment of cucumber seed to improve germination.)**
Arch. Gartenb., 1954, **2**: 173-7, bibl. 7.

Two days' heat treatment (35° C.) of cucumber seed, followed by soaking in tap water at room temperature for 24 hours and drying at 35° C. for another 24 hours, raised the germination percentage in steamed soil from 45 to 80. The treatment was found to be most effective if carried out immediately before sowing. Four days' exposure of the dormant seeds to 35° C. accelerated flowering by one week.—Inst. f. Gartenbau, Dresden-Pillnitz.

551. Fröhlich, H.
Ertragssteigerung der Gurke durch Wärmebehandlung des Saatgutes. **(Heat treatment of cucumber seed to raise yields.)**
Arch. Gartenb., 1954, **2**: 178-81, bibl. 4.

In experiments with two cucumber varieties exposure of the seed to (1) 40° C. for 2 hours, (2) 60° C. for 2 hours and (3) 60° C. for 2 hours after soaking for 12 hours improved germination and increased yields. Germination was adversely affected by seed treatment at 80° C.—Inst. f. Gartenbau, Grossbeeren.

552. Veselovskaja, M. A.
Pre-sowing heat treatment of the seed of cucurbits. [Russian.]
Zemledelie, 1954, **2** (3): 108-9, bibl. 2.

Heat treatment for 3 hours at temperatures varying from 40° to 100° C. were applied at Maikop to cucumber seed of 5 varieties to increase germination and improve crop production, the best results being obtained when the temperatures used were from 50° to 70° C. Higher temperatures, particularly above 80° C., depressed yields. At the West Siberian Vegetable Experimental Station, melons raised from seed submitted to 55–60° C. for 4 hours produced 22% higher yields of mature fruit than the controls. A similar treatment of watermelon seeds resulted in 8% yield increase. Heating cucumber seed for 5 hours at 45–50° C. increased yields by 10%.

553. Friedrich, G., and Schmidt, G.
Untersuchungen über die Nährstoffaufnahme von Treibhausgurken in Wasserkulturen. **(The absorption of nutrients by glasshouse cucumbers in soilless culture.)**
Arch. Gartenb., 1954, **2**: 319-35, bibl. 11, illus.

A few of the cucumber plants grown in nutrient solution culture were analysed at 10-day intervals to determine the absorption from the solution of Ca, Mg, P, K and N. The reducing sugar and starch contents of the dry matter were also estimated. The analytical results were especially remarkable for the high Ca content found in the leaves. In the leaves nitrogen was stored mainly as protein N, while faster growing organs, such as fruits, contained a surprisingly high percentage of soluble N. The composition of the stem varied, as must be expected of an organ of transport. The initial period of fruit set was characterized by a sudden rise in nutrient requirements which further increased during the phase of fruit development to the very end of the growing season. The nutrient solution was not changed during the experiment, losses in minerals being made good by additions in accordance with the amounts absorbed by the plants. It was thus possible to avoid shocks to growing plants which are not infrequently observed after a complete change of the solution. Further, calculations were made on the composition of a nutrient mixture which would restore the original level of the solution when added at certain intervals related to phases of growth. This method of supplementing nutrients would reduce costs considerably in comparison with regular changes of the nutrient solution. The composition of cucumber plants raised in nutrient solution did not differ materially from that of plants raised in soil, although the mineral content of the solution was much lower than that of the soil. The water content of the cucumbers was the same in both cases.—Inst. Obst- u. Gemüsebau, Martin-Luther-Univ., Halle-Wittenberg.

554. Mazaeva, M. M.
Effect of magnesium fertilizers on seed quality. [Russian.]
Agrobiologija, 1954, No. 4, pp. 125-9, illus.

Data are presented showing that the application of Mg to many agricultural plants and some cucurbits on light podzolic peat soils improved seed quality. Watermelons and cucumbers raised from seed of treated plants produced higher yields of better quality fruits than those raised from seed of the control plants.

555. Stoll, K.
Untersuchungen über die nichtparasitäre Gurkenwelke. **(Non-parasitic wilting of cucumbers.)**
Phytopath. Z., 1954, **22**: 177-210, bibl. 142, illus.

Several plant growth and plant protective substances were shown to be phytotoxic to cucumber plants when applied to the roots. The resulting symptoms closely resemble those of a parasitic wilt. The compounds tended to accumulate in the root media when applied carelessly; this was especially noticeable with calcium cyanamide and its decomposition products, and to a lesser extent with herbicidal hormones and contact insecticides. The root tissues damaged were the epidermal parenchyma and the root hairs. The water balance of the roots was disturbed and sometimes the water-conducting tissue was blocked. One of the contact insecticides, ruscalin, caused a toxic effect in the shoot axis similar to that caused by fusarium wilt. The effect of soil and weather conditions on the toxicity of these substances is not yet known.

556. PORTER, C. A.
Histological and cytological changes induced in plants by cucumber mosaic virus (*Marmor cucumeris* H.).
Contr. Boyce Thompson Inst., 1954, **17**: 453-71, bibl. 22, illus.

Changes observed in cucumbers, Easter lilies, tulips and broad beans are set out in some detail.

557. PIERSON, C. F., AND WALKER, J. C.
Relation of *Cladosporium cucumerinum* to susceptible and resistant cucumber tissue.
Phytopathology, 1954, **44**: 459-65, bibl. 17, illus.

The development of cucumber scab, *Cladosporium cucumerinum*, was traced in the tissue of a susceptible and a resistant variety of cucumber. Penetration was identical at 16° C. Thereafter the fungus advanced rapidly in the susceptible variety, especially in the intercellular spaces and vascular strands, and became intracellular after 3–5 days. In the resistant variety the progress of the fungus was arrested by a series of host-parasite relations and it rarely became intracellular.

558. STODDARD, E. M.
Chemotherapeutic control of cucumber scab.
From abstr. in *Phytopathology*, 1954, **44**: 507.

Of 22 materials applied to the soil in control tests on healthy seedlings subsequently inoculated, 4 gave significant control of cucumber scab (*Cladosporium cucumerinum*). These were maleic hydrazide, captan, crude terramycin and 9-cyanoethylcarbazole.

559. MCKEEN, C. D.
***Trichothecium* foliage rot of greenhouse cucumbers.**
Canad. J. agric. Sci., 1954, **34**: 469-72, bibl. 11, illus.

Lesions were found on cucumber leaves which appeared water-soaked at first, but later became dry and brown. The causal organism was identified as *Trichothecium roseum*. The fungus is dependent on decaying organic matter for the start of infection, and is most active under high humidity conditions. Effective control has not been worked out.

560. FRONK, W. D., AND LANA, E. P.
Growth responses of *Cucurbita maxima* Duch. to insecticide treatment.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 289-96, bibl. 6.

Insecticidal dusts and sprays were applied to 3 varieties of winter squash at Ames, Iowa, and the resultant effects on growth measured. Golden Delicious squash treated with 15 sprays and 8 dusts showed highly significant increases in the total length of the main runner. Plants treated with dust usually grew better than plants treated with the same material in the form of sprays. There was a varietal difference in growth reaction to the various insecticides. The average growth per day plotted against time shows differences in reaction of the various varieties to insecticidal application. The variation in growth could not be shown statistically to be due to the number of nodes per runner or the mean internode length. A possible explanation for the variation in growth rate may lie in the control of unknown insect populations. [Authors' summary.]—Ia agric. Exp. Stat., Ames.

Legumes.

(*See also* 27, 37, 39, 41, 42, 43, 48, 53, 75, 76, 397, 508, 518, 521, 527, 556, 703c, h, o, s, u.)

561. YEN, D. E.
Seed variation in pea rogues.
N.Z. J. Sci. Tech., Sect. A, 1954, **36**: 117-21, bibl. 7.

Four rogue lines and 4 normal lines of Onward peas were selected and grown through 2 generations. Differences in single seed weight amongst these lines suggested that they were heritable.

562. ANON.
Poisoning case—the pintanga bean.
Papua New Guinea agric. Gaz., 1954, **8** (3): 56.

The pintanga or pingapinga bean is *Phaseolus lunatus*. The seeds of some wild varieties contain linamarin which breaks down to prussic acid during digestion.

563. FOURMONT, R.
Introduction à un système de nomenclature des variétés de pois cultivées en France. **(Introduction to a system of nomenclature for pea varieties cultivated in France.)**
C.R. Acad. Agric. Fr., 1954, **40**: 499-502, bibl. 8.

The range of vegetative and reproductive characters in pea varieties is described with a view to varietal classification. Particular attention is given to floral characters. [See also *H.A.*, 24: 1566.]

564. ANZILOTTI, G.
Prove di adattamento di alcune razze di piselli mangiatutto. **(Trials on the suitability of some "mange-tout" pea varieties [for introduction into Italy].)**
Riv. Ortoflorofruttic. ital., 1954, **38**: 359-65, bibl. 15, illus.

Nine Dutch varieties of mange-tout pea tested at the Centre of the National Council of Research at Florence were all found unsuitable for introduction into Italy owing to shortcomings in flavour, yield or earliness. Their yields were well below those of Italian varieties of stringless bean.

565. LORZ, A. P.
The development of new varieties of table legumes for production in Florida.
Proc. Soil Sci. Soc. Fla, 1953, 1954, **13**: 64-70, bibl. 4, illus.

A summary is given of recent introductions of snap beans, lima beans, English peas and southern peas adapted to the various cultural areas in Florida.

566. Baudet, —., and others.
Études sur les haricots verts. **(Studies on French beans.)**
Publ. Serv. Hort. Rabat **13,** 1954, pp. 85.

Three separate cultural trials were carried out on French beans in Morocco. Bean seeds sown singly gave better yields than those sown in groups; the best yields were obtained when the row distance was 50–60 cm. In comparative tests between 3 sowings of 3 varieties for processing, Fin de Bagnols was preferable to Empereur de Russie and Saxa so far as the total yield of the best grade was concerned; early sowings between mid-January and mid-February gave the best results. A 4-year trial with 12 varieties resulted in no definite conclusions. Very early sowings did not give a very early harvest as the weather was too cold at the time of sowing. The American varieties tested were not suitable for the French market. Among the French varieties tested Gloire de Deuil, Supermetis and Cabanais gave consistently good results.

567. Dean, L. L., and Hungerford, C. W.
Idaho Bountiful and Golden Gem: curly top- and mosaic-resistant snap beans.
From abstr. in *Phytopathology*, 1954, **44:** 486.

Idaho Bountiful and Golden Gem represent the first high quality bush type snap beans resistant to curly top and 2 strains of common bean mosaic. [From authors' summary.]

568. Anon.
Pole bean experiments.
N.Z. Comm. Gdnrs' J., 1954, **9** (12): 7-8.

In Auckland trials were carried out in a dry summer with runner beans, namely a rust-resistant variety Westralia, 4 Fardenlosa strains and Market Wonder. Pickings of the shiny Fardenlosa strain were much higher than those of the other 3 strains and of Market Wonder at first, but progressively decreased until at the final pickings all varieties were fairly similar. Yields from Westralia were comparable to those of Fardenlosa at the 4th picking but thereafter declined. No rust was apparent until towards the end of the trials.

569. Inoue, Y., and Shibuya, M.
Studies on the reproductive physiology of the common bean (*Phaseolus vulgaris* L.). I. On the differentiation and development of the flower buds. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1954, **23:** 9-15, bibl. 17, illus.

In a study on 4 french bean varieties flower buds developed earlier in tall than in dwarf varieties. In tall varieties they formed first at the 6th and 7th nodes of the main stem and then successively at the upper nodes of the main stem and on the laterals. In dwarf varieties they formed more or less simultaneously throughout the plant. Some 30 days after sowing tall varieties had already developed as many flower buds as would open throughout the season. In sowings between the end of April and the middle of June, the later the sowing date of Kentucky Wonder the greater the number of flower buds differentiated and the faster their development. The environment of the very young plant affects flower formation, flowering and flower drop.

570. Spurný, M.
Propustnost testy pro vodu a otázka nerovnoměrnosti botnání semen hrachu (*Pisum sativum*). **(The permeability of the seed coat and the uneven swelling of pea seeds.)** [English and Russian summaries ¾ p. each.]
Preslia, 1954, **26:** 239-62, bibl. 14, illus.

Results obtained by two described methods show that water penetrates twice as fast through the hilum as through the other parts of the seed coat. The lower permeability of the other parts is due to the presence of suberized or cutinized membranes in the walls of the epidermal cells. About 10% of the seeds tested were found to have impermeable coats. In these seeds the star-like structures of the membranes possessed twice as many points as those in the normally swelling seed. The rate of swelling in seeds of the same weight, with the exception of those under 200 mg., appeared to be uniform.

571. Spurný, M.
Struktura blány palisádových buněk testy semene hrachu (*Pisum sativum*). **(The cell-wall structure of the epidermal cells of the pea seed-coat.)** [English and Russian summaries ½ p. each.]
Preslia, 1954, **26:** 79-88, bibl. 14, illus.

Results of anatomical observations and microchemical tests lead to the conclusion that suberized or cutinized structures are present in the cell wall of the upper half of the epidermal cells. [From author's English summary.]

572. Spurný, M.
Světelná zona epidermálních buněk testy semena hrachu (*Pisum sativum*). **(The "light-line" of the epidermal cells of the pea seed-coat.)** [English and Russian summaries 5 and 8 lines respectively.]
Preslia, 1954, **26:** 139-42, bibl. 12, illus.

Studies have shown that the "light-line" produced by the palisade layer in the pea seed-coat is due to a suberized or cutinized structure in the walls of the epidermal cells.

573. Wager, H. G.
The effect of artificial wilting on the sugar content and respiration rate of maturing green peas.
New Phytol., 1954, **53:** 354-63, bibl. 31.

When green peas were wilted and then held for varying times at 15° or 25° C. it was found that (*a*) the rate of loss of sugar and the rate of CO_2 production decreases greatly as the water content is reduced, (*b*) at any one water content, the rate of loss of sugar does not change with time until all the available sucrose is used up, and (*c*) the rate of utilization of sucrose in synthetic reactions is markedly dependent on water content, decreasing as the water content is reduced.—D.S.I.R., Cambridge.

574. Hewitt, E. J., Bolle-Jones, E. W., and Miles, P.
The production of copper, zinc and molybdenum deficiencies in crop plants grown in sand culture with special reference to some effects of water supply and seed reserves.
Plant and Soil, 1954, **5:** 205-22, bibl. 24, illus.

(1) A method is described for the production of acute deficiencies of Cu, Zn or Mo in large-scale sand cultures in which an adequate and satisfactory supply of water was obtained by treating rain water with ion-exchange resins. Results compared favourably with the use of glass distilled water. (2) Visual symptoms of Cu, Zn and Mo deficiencies in large-seeded leguminous crops, and in other species are summarized. (3) Seed reserves played an important part in the incidence of Cu and Mo deficiencies and to a lesser extent of Zn deficiency in pea, runner bean, dwarf bean and broad bean. (4) The "deficient" seed was obtained by harvesting seed from plants grown in the respective deficiency sand cultures, and was compared with seed obtained similarly from complete nutrient sand cultures or commercially from field-grown plants. (5) Seed reserves of Mo were usually sufficient for a complete generation but reserves of Cu and Zn were not adequate for the whole Cu or Zn requirements of the plants. (6) Analytical data showed a marked decrease in the Cu or Mo content of "deficient" seed, and a less striking decrease in Zn. (7) Foliage of deficient plants showed decreased content of Cu and Mo and often of Zn compared with plants given the complete nutrient treatment, but use of "deficient" seed only decreased yields without further appreciably decreasing the mineral content of the foliage. [Authors' summary.]—Long Ashton Res. Stat. and N.A.A.S., Kirton.

575. Mulder, E. G.
Molybdenum in relation to growth of higher plants and micro-organisms.
Plant and Soil, 1954, **5**: 368-415, bibl. 50, illus.

A series of pot and field experiments was carried out with several crop plants, and the effect of certain soil characters on added molybdate was studied. In pots of ironstone soils peas and beans (*Phaseolus*) did not respond to added Mo, both being able to fix adequate N without Mo. Cauliflowers growing in Mo-deficient soils showed severe deficiency symptoms, many died at an early stage and survivors developed whiptail. Mo applications evoked considerable response from the plants, 4 kg./ha. of sodium molybdate giving the best results. Cabbage, under similar conditions, was less liable to early death and responded to smaller amounts of Mo than cauliflower. Turnip, radish, lettuce, spinach and tomato all responded clearly to added Mo in these soils. On very acid soils cauliflower responded in most cases to added sodium molybdate, but relatively high Mo values were found in some soils in which cauliflower plants were showing severe symptoms of Mo deficiency. This was probably due to the inhibiting effect of manganese sulphate on Mo uptake by cauliflower which was clearly demonstrated in pot and field experiments, in which increasing amounts of molybdate and manganese sulphate were applied. Lettuce was also affected by manganese sulphate applications although to a lesser extent, but it had no effect on the Mo uptake of spinach and tomato. This effect of manganese sulphate was shown to be due to the influence of both ions. Phosphate applications to cauliflowers in pot experiments improved plant growth and Mo uptake, even at low rates of molybdate application. The health of cauliflower plants growing in P-deficient soils, and showing Mo deficiency symptoms, was improved by molybdate applications. Phosphate applications to these soils without added Mo reduced the Mo deficiency symptoms in cauliflower, smaller phosphate applications being necessary when Mo was also supplied. Mo deficiency symptoms in cauliflower were less marked when no N was added than with high concentrations of added nitrate. With cauliflower, spinach and tomato plants there was no difference in response between plants supplied with ammonium nitrate and those supplied with nitrate only. There was some evidence that Mo plays a part in nitrate reduction of green plants.—Agric. Inst. Soil Res., Groningen.

576. Leach, W., and Taper, C. D.
Studies in plant mineral nutrition. II. The absorption of iron and manganese by dwarf kidney bean, tomato and onion from culture solutions.
Canad. J. Bot., 1954, **32**: 561-70, bibl. 11.

Dwarf kidney beans and tomatoes were grown in complete nutrient solutions containing various concentrations of Fe and Mn. It was found that the Fe to Mn ratio in the culture solutions must be within a definite range in order to avoid deficiency symptoms in the experimental plants. For the dwarf bean this range was 1·5 to 3·0, and for the tomato it was 0·5 to 5·0. Concentration ratios outside the optimum range produced either Fe or Mn deficiency symptoms. Concentrations below minimum values of both Fe and Mn always produced deficiency symptoms irrespective of the ratio of Fe to Mn in the culture solutions. An apparent antagonism between the absorption of Fe and of Mn was observed with both beans and tomatoes grown in nutrient solutions. This antagonism was also found to occur with onions grown in solutions containing only the sulphates of the two metals. It was further found that with onions growing in single salt solutions of the sulphates of Fe and Mn, the concentration of Fe or Mn in the solutions did not affect the amounts of the metals absorbed by the plants from the solutions. The combined amount of Fe plus Mn absorbed appeared to remain constant irrespective of the Fe to Mn ratio in the culture solution. [Authors' abstract.]—Dep. Bot., Univ. Manitoba, Winnipeg.

577. Fergus, I. F.
Manganese toxicity in an acid soil.
Qd J. agric. Sci., 1954, **11**: 15-27, bibl. 15, illus.

The occurrence of Mn toxicity in french bean grown on an acid soil (referred to as the Dagun soil) is reported. The Mn content of the plants in the field varies with the pH of the soil, reaching 3,000 p.p.m. at pH 4·4. Healthy plants contained between 200 p.p.m. and 1,000 p.p.m. Mn and values greater than 1,000 p.p.m. may be regarded as indicating Mn toxicity. French bean is a good indicator plant for excessive Mn in the soil. A pot trial indicated that the excessive uptake of Mn by french bean grown on the Dagun soil can be controlled by applying lime to raise the pH to about 5·4. Some evidence is presented that pineapples grown on the Dagun soil and peanuts grown on certain other soils suffer from Mn toxicity. [From author's summary.]

578. Nettles, V. F.
Yield responses of beans to repeated use of soil fumigants and three sources of nitrogen.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 320-4, bibl. 1, illus.

Continued use of the fumigants, dichloropropane-dichloropropene mixture and 41% ethylene dibromide [for root-knot control] for five crops resulted in no harmful effect with beans grown on sandy soils. The use of soil fumigation resulted in larger yields from all crops treated. Broadcast and "in-the-row" methods of fumigant application were equally effective. The two fumigants were also equally effective except for the 1953 season when the plots treated with the dichloropropane-dichloropropene mixture produced higher yields. Bean yields were greater in all years when the plots were fertilized with all or part of the source of nitrogen being derived from ammoniacal nitrogen. [Author's summary.]—Fla agric. Exp Sta., Gainesville.

579. Canuto, C. A., and Skiles, R. L.
Appraisal of bean disease losses in Colombia.
From abstr. in *Phytopathology*, 1954, **44**: 484.

Bean foliage diseases common in Colombia are listed. The application of protectants to determine the severity of the diseases showed that some varieties, previously considered poor yielders, actually have a high genetic potential for yield. The improvement programme is now concentrated on disease resistance factors instead of on combining genes for resistance and yield.

580. Farooqui, H. M., and McCollum, J. P.
Relation of morphological structure and development to seed coat rupture in beans (*Phaseolus vulgaris* L.).
Proc. Amer. Soc. hort. Sci., 1954, **63**: 333-41, bibl. 5, illus.

A study was made to obtain more information on the nature of the bean malady known as seed coat rupture and factors affecting its occurrence, and also to find apparent characters which are associated with the rupturing tendency that may be used as a basis in selecting for resistance. Rupturing seemed to be associated with conditions most favourable for growth. When growth during the time of seed development was restricted by a deficiency of water the percentage of rupture was strikingly reduced. The highest amount of rupture occurred in pods from the earliest flowers, which developed while the plants were in the most vigorous condition. The data indicate a relationship between high yields and increased rupture. There did not seem to be a relationship between rate of seed development and rupture. There was no evidence for susceptibility to rupture being due to tenderness of the seed coat. The rate of development of the testa in relation to that of the cotyledons may be a factor in rupture. The high incidence of cotyledonal abnormality found in susceptible strains indicates that this character may be a conditioner for rupture. It can easily be observed during germination and thus eliminated from breeding lines. Under conditions favouring high yields a percentage of ruptured seeds in susceptible varieties may be expected.—Univ. Ill., Urbana.

581. Yarwood, C. E., and Middleton, J. T.
Smog injury and rust infection.
Plant Physiol., 1954, **29**: 393-5, bibl. 9, illus.

Bean and sunflower leaves infected with rust (*Uromyces phaseoli* or *Puccinia helianthi*) were less injured by natural or artificial smog than healthy leaves. Leaves infected with rust for 7 days required about 5 times as long an exposure to smog as healthy leaves to produce the same degree of damage. Tissue in which the rust mycelium was killed by heat was still resistant to smog damage.—Univ. Calif.

582. Swenson, K. G., Davis, A. C., and Schroeder, W. T.
Reduction of pea virus spread by insecticide applications.
J. econ. Ent., 1954, **47**: 490-3, bibl. 7.

On small plots, using parathion and demeton to control the pea aphid, *Macrosiphum pisi*, virus disease incidence was reduced from 53% in untreated plots to 24% in plots receiving 3 parathion sprays. In 3 larger plantings 3 parathion treatments reduced virus incidence from 13·3 to 3·2%, from 29·0 to 8·4% and from 21·9 to 10·4% respectively. From yield records it appears that in some cases a reduction of as little as 11·5% is of economic significance.—N.Y. St. agric. Exp. Stat., Geneva.

583. Hervert, V.
Pukusy o devirisaci teplem a vyprovokování virosních příznaků u fazolí. (**Experiments on virus control by heat and the promotion of virus symptoms in beans.**) [Russian and German summaries.]
Preslia, 1954, **26**: 33-42, bibl. 6, illus.

Experiments are reported on seed transmission of *Phaseolus* virus 2. Under normal conditions of cultivation the virus remained latent, but by means of interference with plant metabolism it was possible to activate it. Heat and other methods of seed treatment actually increased virulence. When plants from treated seed were grown under artificial conditions, under glass, the disease symptoms differed from those produced outdoors. This is a further proof of the possibility of altering virus symptoms and of their dependence on environment.

584. Németh, M.
A paszuly új hervadásos betegségének hazai előfordulása. (**A wilt disease of beans new to Hungary.**) [English and Russian summaries ½ p. each.]
Növénytermelés, 1954, **3**: 135-42, bibl. 6, illus.

The most conspicuous symptom of the disease, observed for the first time on certain varieties of runner bean in 1953, was a sudden complete wilting in the green-ripe stage. The roots were severely damaged and showed black discoloration, and on the shoots, pods and petioles necrotic spots appeared. The disease was found to be seed transmissible. It is probable that the wilt is identical with the disease known in the U.S.A. as "black root" and in Germany as "Schwartzbeinigkeit", and is in fact a hypersensitive reaction to the bean mosaic virus (*Marmor phaseoli*).

585. Morris, H. E., and Afanasiev, M. M.
Control of bacterial halo blight on garden bean in Montana in 1952 and 1953.
From abstr. in *Phytopathology*, 1954, **44**: 499.

Bordeaux mixture, basic copper sulphate, zineb, manzate and captan were compared, each being applied 2 and 4 times. In 1952 bordeaux and copper sulphate applied 4 times gave the best control on leaves, stems and pods, but there were no significant differences as between any of the bactericidal treatments. In 1953 the bordeaux plot produced one of the best yields and gave 98% marketable pods compared with 63–75% with the other chemicals and 56% in the control. Four applications were distinctly better than two.

586. Wark, D. C.
Factors influencing the development of bacterial blight of peas.
Aust. J. agric. Res., 1954, **5**: 365-71, bibl. 7.

Garden peas commonly carry a nucleus of plants with bacterial blight (*Pseudomonas pisi* Sackett) in a masked form. When such plants were exposed to low temperature, either by natural frosting or by dipping the tops of the plants in cold liquids, the number of bacteria in the tissues increased rapidly and typical symptoms of the disease occurred in a few days. Soil type and soil moisture content also influenced the development of the disease, which was more marked in peas grown on a red loam from the Dickson Experiment Station than in peas grown on a prepared potting soil. Disease symptoms developed more rapidly at high soil moisture content than at lower soil moisture content, following exposure to high atmospheric humidity. [Author's summary.]—C.S.I.R.O., Canberra.

587. Skolko, A. J., Groves, J. W., and Wallen, V. R.
Ascochyta diseases of peas in Canada—with special reference to seed transmission.
Canad. J. agric. Sci., 1954, **34**: 417-28, bibl. 36.

Among fungal species isolated from germinated pea seeds *Ascochyta* spp. were the most frequently isolated of known pathogenic fungi. Tests over 12 years on almost 5,000 Canadian pea seed samples showed that 51% of the samples were infected and 18% heavily infected. Seed from eastern Canada was more heavily infected than that from Alberta and British Columbia. Varietal susceptibility was also studied, and it was shown that some varieties with abundant disease symptoms in the field produced relatively disease-free seed, and other varieties, apparently highly resistant, sometimes produced heavily infected seed.—Bot. and Plant Path. Div., Ottawa.

588. Burke, D. W.
Pathogenicity of *Fusarium solani* f. *phaseoli* in different soils.
From abstr. in *Phytopathology*, 1954, **44**: 483.

Inocula sufficient to cause severe bean rot in a virgin soil in the greenhouse caused much less damage in soil from a root-rot-free field. Studies showed that the pathogen-suppressing property of the healthy soil was microbiological, and that in both soils the organism survived only as chlamydospores, which were larger and more numerous in naturally infected soil.

589. Leach, L. D., and others.
Lima bean seed treatment trials in California, 1950-52.
Plant Dis. Reptr, 1954, **38**: 193-9, bibl. 6.

In nearly all trials conducted in 1950, '51 and '52 bean stands were materially improved by seed treatments—described—with a good fungicide. The addition of lindane, in amount varying with soil insect infestation, gave adequate protection against soil insects and the fungicide eliminated most of the phytotoxic effects of the lindane on the emerging seedlings.—Univ. Calif., Riverside.

590. Sherman, M., Tamashiro, M., and Fukunaga, E. T.
Control of greenhouse whitefly and other insects on beans in Hawaii.
J. econ. Ent., 1954, **47**: 530-5.

In 3 experiments in which 3 sprays were applied at weekly intervals to control whitefly, *Trialeurodes vaporariorum*, on pole bean, 0·032% parathion and 0·063% EPN gave excellent results while the following gave good results: 0·016% parathion, 0·25% DDT, methoxychlor and chlordane, 0·125% toxaphene and dieldrin, and 0·063% aldrin. In a fourth experiment comparing the effectiveness of weekly and fortnightly applications, EPN was equally effective under both application schedules but parathion, malathion and CS-708 were better when applied at weekly intervals. All the insecticides tested gave satisfactory control of the bean pod borer, *Maruca testulalis*, and the bean leafhopper, *Empoasca solana*. [See also *H.A.*, 24: 2704.]

591. Ditman, L. P., Rosenberger, C. R., and Harrison, F. P.
Spraying for control of bean insects.
J. econ. Ent., 1954, **47**: 600-3, bibl. 2, illus.

In both plot and field experiments in Maryland the Slosser-type boom equipment was highly satisfactory for spraying snap and lima beans. CS-708 was slightly superior to malathion against Mexican bean beetle [*Epilachna varivestis*] and potato leaf hopper (*Empoasca fabae*]. CS-708 was not effective against black bean aphid [*Aphis fabae*] and two-spotted spider mite [*Tetranychus bimaculatus*], but malathion was effective against both. Alternating sprays of CS-708 and malathion appear to be desirable for control of all pests except corn earworm [*Heliothis armigera*]. Against earworms on lima beans DDT treatments using 5 nozzles per row appeared satisfactory.

592. Walrave, J.
Proeven met systemische insecticiden. II.
(Tests with systemic insecticides. II.)
[English summary ½ p.]
Tijdschr. PlZiekt., 1954, **60**: 205-20, bibl. 9.

When the upper or lower surfaces of bean leaves were sprayed with Pestox III or Systox, aphids feeding on the untreated sides of the leaves were killed as quickly as those feeding on treated sides. In bean leaves transport from the tip to the base of the leaf was quicker than the reverse, while transport across the leaf was intermediate between the two. Systox was reanslocated in lethal quantities more often than Pestox.

593. Pramer, D.
The movement of chloramphenicol and streptomycin in broad bean and tomato plants.
Ann. Bot. Lond., 1954, **18**: 463-70, bibl. 7.

Tomatoes and broad beans were used as test plants in studies on the translocation of antibiotics. Cut shoots contained more antibiotic than rooted plants. Chloramphenicol was distributed throughout plants treated with 200 μg./ml. solutions for 19 hours, but the concentration at the base of plants was greater than that at the top. After 5 days' treatment the concentration of chloramphenicol was uniform throughout the plant. Rooted broad bean plants grown for 18 hours in streptomycin solutions containing 500 μg./ml. had a trace of antibiotic in the bottom leaves only. Streptomycin moved more readily in cut shoots of broad bean, and cut shoots and rooted tomato plants, but the antibiotic content was greater in the bottom than in the top leaves. The accumulation of streptomycin in rooted broad bean plants was exceedingly slow.

594. Lowig, E.
Beobachtungen über die Reaktion des Erbsenkäfers auf Ausseneinflüsse. **(Observations on response of the pea weevil to environmental influences.)**
Saatgut-Wirtsch., 1954, **6**: 200-3, 231-2, bibl. 1.

The biology of *Bruchus pisorum* is discussed. Control of the pest was achieved by treating affected lots of seed with DDT or BHC or by excluding air from stored seed for a fortnight. The action of this latter measure could probably be accelerated by introducing CO_2 into the container before sealing. The germination capacity of healthy seed was not affected by 3 months' storage in sealed containers, whereas infested seed did not germinate whatever the conditions.

595. Marth, P. C., and Wester, R. E.
Effect of 2,4,5-trichlorophenoxyacetic acid on flowering and vegetative growth of Fordhook 242 bush lima beans.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 325-8, bibl. 5.

Spray applications of 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) at relatively low concentrations (1·5 and 3 p.p.m.) applied twice during the early flowering period to Fordhook 242 bush lima beans caused the plants to drop almost all their flowers and to cease vegetative growth for a period of 20 to 30 days or even longer. After the plants resumed growth they developed many more axillary branches than the controls and were very bushy in appearance. In 1952 the treated plants were delayed in maturity and developed vegetative growth 172 to 213% heavier than those of controls. Pods on the sprayed plants matured late and were killed by frost. Where no frost interfered, the sprayed plants produced 18 to 35% more fresh marketable pods than did untreated controls. Control plants which had had their early flowers removed by hand also produced 33% more pods than did untreated ones, but the plants themselves were finally no larger than the controls. Addition of the foliar nutrient Na-Churs containing boron and other minor elements to the 2,4,5-T sprays had little effect at 1·5 p.p.m. 2,4,5-T concentration, but at 3 p.p.m. the combination resulted in plants that were drastically stunted and very slow in recovery. [Authors' summary.]—Plant Indust. Stat., Beltsville, Md.

596. Dutcher, A. W.
Pallet boxes speed handling, cut many costs.
Mkt Grs' J., 1954, **83** (9): 13, 21, illus.

Wirebound pallet boxes have proved much more satisfactory than the standard bushel hampers for the handling of green beans in Maryland. The lightweight boxes, 46 × 40 × 30 inches, are convenient for collecting beans from the field, permit easy inspection, are quick to unload and save storage space. A farm experiment has shown that in harvesting 190 acres of snap beans the pallet box system eliminated the use of 1 truck and 10 labourers. Experiments are now being conducted on the use of these boxes for other vegetables.

597. Reed, L.
Mechanical bean picker does clean job.
Mkt Grs' J., 1954, **83** (9): 12, 22, illus.

An improved bean picker, which has given satisfactory results in green and wax bean fields in N.Y. State, is described and illustrated. The machine cuts the vines and is therefore used only on the second picking. It picks about an acre per hour and will do the work of 40–50 hand pickers. It is considered that the machine will replace hand picking once a bean variety has been produced that will mature most of its crop at the same time.

598. Sayre, C. B.
Comparison of the tenderometer and maturometer for measuring the quality of raw peas.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 371-7, bibl. 4, illus.

There was a high positive correlation between tenderometer readings and maturometer readings and each showed a high correlation with alcohol-insoluble solids analyses. There is much less variation in duplicate tenderometer readings than in repeated maturometer readings of a given sample, but each instrument will measure satisfactorily the quality of raw peas within the limits of accuracy of field sampling. There is an extraordinary variation in maturity of field-grown peas and a number of samples must be taken from a field accurately to judge its maturity. [Author's conclusions.] —N. York State agric. Exp. Stat., Geneva.

599. Patron, A.
Compte-rendu des essais de conservation de petits pois écossés effectués en Avril 1954. **(Report on tests on storage of shelled peas made in April 1954.)**
Terre maroc., 1954, **28**: 375-6.

Chemin long peas kept better between shelling and canning when blanched. At the normal storage temperature of 20° C. blanched peas kept better dry than in water, but at 0° C. they kept slightly better in water. After 6 hours' storage only the blanched peas stored in water or dry at 0° C. and the blanched peas stored dry at 20° C. were fit for canning. After 12 hours only those stored in water at 0° C. were fit for canning.

600. Hoover, M. W., and Dennison, R. A.
A study of certain biochemical changes occurring in the southern pea, *Vigna sinensis*, at six stages of maturity.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 402-8, bibl. 9, illus.

There was an increase in the alcohol-insoluble solids and starch contents with maturity, and a decrease in the percentage moisture, protein, total and reducing sugars.—Fla agric. Exp. Stat., Gainesville. [See also *H.A.*, 24: 2689.]

601. JENKINS, W. F.
Study shows post harvest changes in southern peas.
Miss. Fm Res., 1954, **17** (3): 6-7.

The greatest post-harvest change taking place in either refrigerated or non-refrigerated Southern peas [*Vigna sinensis*] was a loss of ascorbic acid. Peas held in non-refrigeration lost ascorbic acid more rapidly than those refrigerated for the same length of time. Sugars in Dixielee peas increased under refrigeration, but no such increase occurred in the Brown Crowder variety under like conditions. The alcohol insoluble solids, moisture and alcohol soluble colloids in both refrigerated and non-refrigerated peas remained rather stable for the duration of this experiment. Evidence is presented that non-refrigerated peas can be kept for two days in shaded conditions in summer and refrigerated peas can be kept for six days without materially affecting their edible qualities. [Author's conclusion and summary.]

Mushrooms.

(*See also* 391.)

602. SUGIHARA, T. F., AND HUMFELD, H.
Submerged culture of the mycelium of various species of mushroom.
Appl. Microbiol., 1954, **2**: 170-2, bibl. 7, illus.
EDWARDS, R. L.
Submerged culture of mycelium of various species of mushrooms.
Bull. Mushroom Grs' Ass., 1954, No. 59, pp. 355-6.

The author of the second article gives notes on the article by Sugihara and Humfeld, in which they describe their original work. Twenty species of edible fungi were grown in submerged culture, which consisted of a liquid medium* through which air was constantly bubbled. A rapid growth of mycelium was obtained from 1 cream and 1 white variety of cultivated mushroom (*Agaricus campestris*). Of other species tried only *Lepiota rachodes* thus grown had a pleasant flavour. The problem of retention of the normal flavour has still to be solved. Once that is done an entirely new source of food supply rich in carbohydrates and vitamins should be available. Other possible products are antibiotics and vitamin concentrates. Edwards notes that, while the submerged culture method might be much cheaper than ordinary mushroom culture, the products could at present only be used for soup manufacture or flavouring.

603. HALBINGER, R. E.
Aplicación del método del micelio sumergido al cultivo de hongos comestibles. **(Application of the method of submerged culture to the production of edible fungi.)**
Rev. argent. Agron. B. Aires, 1954, **21**: 162-76, bibl. 24.

The development of edible fungi in artificially aerated liquid media was studied with a view to obtaining a product of good flavour which would form an economical substitute for normally-grown mushrooms in the preparation of soups, condiments and sauces. A number of strains of *Psalliota campestris* and other edible fungi were cultured under different conditions of temperature, reaction and aeration in media providing different sources of carbohydrates and nitrogen. Some strains gave good results.—Cáted. Microbiol. Agríc., Fac. Agron. B. Aires.

Onions and related crops.

(*See also* 508, 509, 510, 526, 576, 651.)

604. ISENBERG, F. M. R., JENSEN, C. O., AND ODLAND, M. L.
Effect of maleic hydrazide on the respiration of mature onion bulbs.
Science, 1954, **120**: 464-5, bibl. 4.

Sweet Spanish onions were grown from seed, and 14 weeks after planting were sprayed with maleic hydrazide at several concentrations. After harvesting, curing and storing, tests were made to determine dehydrogenase activity and respiration. Results showed that low concentrations of maleic hydrazide were stimulatory and high concentrations were inhibitory to respiration. An increase in dehydrogenase activity and oxygen absorption was obtained by adding succinate to minced suspensions prepared from plants that had received low concentrations of hydrazide, but succinic dehydrogenase appeared to be markedly inhibited in material from plants treated with high hydrazide concentrations. Treatments of 3,000 and 4,000 p.p.m. maleic hydrazide markedly inhibited sprouting of stored bulbs.

605. LACHMAN, W. H., AND UPHAM, E. F.
Effect of warm storage on the bolting of onions grown from sets. (A preliminary report.)
Proc. Amer. Soc. hort. Sci., 1954, **63**: 342-6, bibl. 12.

In this paper the authors describe attempts to introduce the warm storage method, in practice for several years in Europe, for the prevention of bolting in onion sets, and to determine the value of the method in producing the crop as it is grown in the Connecticut Valley. Experiments showed that onion sets subjected to warm storage at 86° F. for 5–9 weeks after being removed from common storage bolted significantly less than compatable sets given 9 weeks' cold storage at 32° F. Bolting was reduced progressively as the period of storage in the warmth was increased. The crop yield tended to be greater and bolting was delayed longer in sets given warm storage. Warm storage did not reduce splitting of bulbs but did tend to make mature bulbs more globe-shaped. Bolting and flower production reduced the average bulb weight, but flower bud removal tended to increase bulb size.—Mass. agric. Exp. Stat., Amherst.

606. TOZLOSKI, A. H.
Control of onion maggot on seed sets in the Connecticut Valley.
J. econ. Ent., 1954, **47**: 494-7, bibl. 12.

Among treatments tested, mixing 0·5 lb. of 10% DDT or 1% dieldrin with 1 lb. of seed gave the most effective control of onion maggot, *Hylemyia antiqua*. The same materials used in the coating of pelleted seed gave comparable results, but were more inconvenient to apply. Spraying proved less satisfactory and more expensive.

---

* Different media composed by authors or in the Culture Collection of the Northern Regional Research Laboratory, Peoria, Ill.

607. Finlayson, D. G., and Handford, R. H.
Experiments on control of the onion maggot, *Hylemyia antiqua* (Meig.), in the interior of British Columbia.
Canad. J. agric. Sci., 1954, **34**: 385-8, bibl. 4.

Experiments were carried out in 2 localities in the interior of British Columbia in 1951 to find a more effective and less expensive material than calomel for controlling the onion maggot. Seed treatment with 50% wettable DDT was the most practical substitute. 25% wettable lindane, applied to the soil surface at 10-day intervals gave equally good control of the maggot and was less phytotoxic than DDT, but was more expensive. Seed treatments with very low rates of wettable aldrin and dieldrin gave promising results. Emulsions of aldrin, chlordane, dieldrin and DDT, applied to the drills before sowing, greatly reduced germination and yield.—Ent. Lab., Kamloops, B.C.

608. Richardson, B. H.
Control of onion thrips in the Winter Garden in 1953.
J. econ. Ent., 1954, **47**: 616-18, bibl. 5.

In further experiments in Texas [for earlier work see *H.A.*, 23: 4251] on the control of onion thrips [*Thrips tabaci*], 2·5% dieldrin and 5% heptachlor were the most effective of the chlorinated hydrocarbons tested, giving good residual control 20 days after treatment. Of the phosphate insecticides, 2% parathion and 1% methyl parathion gave the best average reduction of thrips populations over a period of 16 days. Results of timing experiments indicate that treatments made at 21-day intervals would be the most practical commercially.

609. Malmtöf, O.
Løkkjellere. **(Storage cellars for onions.)**
Gartneryrket, 1954, **44**: 677-9, illus.

In this article, which is a translation from a Swedish trade journal, above- and underground storage buildings for onions are described and illustrated.

610. Lipatova, C. P.
Southern garlic in the north of the Urals. [Russian.]
Agrobiologija, 1954, No. 3, pp. 127-8, illus.

Cloves of garlic produced plenty of leaf but inadequate bulbs during the year of planting. The following season the bulbs developed normally and, in addition, instead of flowers some very small aerial bulbs were formed on modified stalks.

611. Tims, E. C.
Pink root of shallot, *Allium ascalonicum*.
Plant Dis. Reptr, 1953, **37**: 533-7, bibl. 18.

Losses from pink root, the primary cause of which is *Pyrenochaeta terrestris*, are due chiefly to (1) stunting of affected plants owing to root injury, (2) killing back of leaf tips making plants unmarketable. Control measures include: growing of seed in areas free from the disease, treatment of planting sets with fungicides before planting—but injury therefrom has generally offset the advantages—, breeding for resistance—work started in 1949 is still in progress—, and rotational planting—the results unproved as yet.

612. Freeman, T. E., and Tims, E. C.
Antibiosis as a possible limiting factor of pink root of shallots.
From abstr. in *Phytopathology*, 1954, **44**: 488.

In a field of shallots in Louisiana pink root was severe on silty clay and absent on heavier clay. The latter soil was found to contain a higher proportion of actinomycetes antagonistic to the pathogen at all seasons of the year. It was also found that certain actinomycetes reduced the severity of pink root in sterile soil.

Parsley.

(*See also* 621.)

613. de Zeeuw, D. J.
Pythium root rot of parsley.
From abstr. in *Phytopathology*, 1954, **44**: 486.

A species of *Pythium* isolated from parsley near Grand Rapids, Michigan, causes a root rot and loss of vigour during the cutting season. Yields are reduced by up to 50%. Symptoms are stunting, chlorosis, purple discoloration of the leaves, and poor development of the secondary root system.

Root crops.

(*See also* 61, 62, 506-510, 575, 703d.)

614. Hodge, W. H.
The edible arracacha—a little-known root crop of the Andes.
Econ. Bot., 1954, **8**: 195-221, bibl. 30, illus.

Arracacia xanthorrhiza (*A. esculenta*) is a stout, semi-caulescent herb, one of the largest of the cultivated umbelliferae. There are 3 main horticultural varieties differing from one another in the colour of the flesh of the roots. Propagation is entirely vegetative, by offsets or shoots produced from the crown of the main rootstock. The crop is harvested from 10 to 14 months after planting. All parts are fully utilized, the roots for cooking, the shoots for planting and the remains for fodder or for mulching.

615. Kazarjan, V. O.
Vegetative propagation of biennial root crops. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **95**: 407-10, bibl. 8, illus.

From the dormant buds of root cuttings and topped, small roots of sugar, fodder and table beets 3 or more rosettes of leaves developed. The plants remained in a vegetative condition and produced malformed but very large roots, weighing 8–9 kg. The greatly increased yield of root crops propagated by cuttings as compared with those propagated by seed is stated to be due to a high accumulation of nutrients in the cuttings, increased provision of photosynthetic products by the larger number of leaves and the more advanced phasic development of the cuttings from which the plants develop.

616. SAYRE, C. B.
Effect of boron on beets and crops which follow.
Bett. Crops, 1954, **38** (7): 15-16, 36-7, bibl. 2.

Beets have a relatively high boron requirement and deficiency of this element, most likely to occur on alkaline soils, causes an internal breakdown known as black spot or dry rot. Boron is applied as borax or added to mixed fertilizers in the form of pentahydrate of sodium tetraborate containing 14·85% B. Quantities of B as borax or pentahydrate borate to be included in 2 standard beet fertilizers are recommended for soils of different pH. Crops suitable to follow beets receiving B for 2 or more years in succession include cabbage, broccoli, cauliflower, turnip and celery.

617. DOUGLASS, J. R., AND COOK, W. C.
The beet leafhopper [*Eutettix tenellus*].
Circ. U.S. Dep. Agric. **942,** 1954, pp. 21, illus.

The beet leafhopper, as a vector of curly top virus, constitutes a serious menace to beans and tomatoes grown in the western United States; cucurbits, spinach, garden beet and spinach beet may also be seriously affected. The leafhopper breeds on vast weed areas which have grown up over abandoned farmland, and the 6 major breeding areas in this part of the U.S.A. occur in arid or semi-arid regions. Long-term control may be obtained by spraying the breeding areas with herbicides, and planting them with non-host grasses. DDT spraying or dusting of breeding grounds or crops will help to lessen the leafhopper population. Planting resistant varieties and timing of planting dates can also reduce curly top damage.

618. DEMORTIER, G., AND DROEVEN, G.
Le krilium.—Le krilium améliore-t-il de façon durable les propriétés physiques des sols? **(Does the improving action of krilium on physical properties of soils persist?)**
Rev. Agric. Brux., 1954, **7**: 1089-1101, illus.

Data were collected on the condition of soils during the second year after treatment with krilium. In a pot experiment it was shown that the stable aggregate percentages were still higher in treated soils than in the controls, and that carrots grown in treated soils in general had longer, less forked roots than those grown in untreated soils. In an experimental plot there was a more noticeable reduction in the stable aggregate percentage, and a slightly smaller, although still considerable, effect on carrots grown in treated soil, when compared with first year results. The authors conclude that the action of krilium persists during the second year after treatment, but some reduction in its efficiency is caused by mechanical operations.

619. BUDNICKAJA, E. V.
Early biosynthesis of carotenoids in the roots of carrots. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1953, **90**: 833-5, bibl. 14.

The concentration of carotenoids increased in sections of carrots during early storage, and conditions of darkness, higher temperatures and the addition of CO_2 enhanced this increase. [See also *H.A.*, 24: 3889.]

620. WHITNEY, N. J.
Investigations of *Rhizoctonia crocorum* (Pers.) DC. in relation to the violet root rot of carrot.
Canad. J. Bot., 1954, **32**: 679-704, bibl. 17, illus.

The detailed studies reported include observations on the distribution and symptoms of violet root rot in Canada, culture investigations of *R. crocorum*, factors affecting parasitism including age of carrot, temperature and soil pH, and host-parasite relations. Histological responses of the carrot root to infection are recorded.—Univ. Toronto.

621. WAGN, O.
Bladtaeger (Miridae) og forekomst af frø uden kim hos skaermblomstrede (Umbelliferae). **(Plant bugs and the incidence of embryoless seeds in Umbelliferae.)** [English summary 2½ pp.]
Tidsskr. Planteavl, 1954, **58**: 58-90, bibl. 26, illus.

In Denmark the average germination figures of carrot, dill and parsley seed are only 62·7, 64·5 and 67·7%. Following up work done at the Boyce Thompson Institute the author showed that also in Denmark *Lygus* spp. (chiefly *L. campestris*, *L. kalmi* and *L. pubescens*) are largely responsible for a high percentage of embryoless seed in these crops. He found that one or two applications of DDT shortly after flowering reduced the number of such seeds and increased germination by 10%. The biology of the bugs and the nature of the injury are discussed in detail. The investigation was carried out at Lyngby in co-operation with commercial seed growers. Illustrations, tables and graphs are printed with English captions.

622. LEAR, B., AND OTHERS.
Yields and off-flavour of potatoes and carrots grown on plots receiving annual soil treatments.
From abstr. in *Phytopathology*, 1954, **44**: 496.

Seventeen chemicals including soil fumigants, fungicides and others were applied to carrot crops either once each as a 10-year dose or annually for 3 years at the normal annual rates. The only annual dosage causing yield reduction was that of Dow 9B (32% zinc trichlorophenate) and the reduction occurred in only 2 out of the 3 years. The 10-year dosages which caused yield reduction were those of D-D, Dowfume N (dichloropropane-dichloropropene mixtures), Dow 9B and dichlorobutenes; the reduction persisted for 2 years with Dow 9B and for 1 year with the others. Off-flavour was detected only with the 10-year dosage of D-D and Dowfume N after 1 year but not after 2 years.

623. ZETTERSTRÖM, P.
Mera om bekämpningen av kål- och morotflugor. **(Further notes on the control of the cabbage root fly and the carrot fly.)**
Växtskyddsnotiser, 1954, No. 1, pp. 6-8.

Mixing the seed with a 20% lindane dust at the rate of 70 g./kg. proved as efficient as watering with chlordane (see *H.A.*, 24: 1544) for the control of carrot fly and was much less laborious. The treatment was not applicable to the control of cabbage root fly on turnips, as the dust did not adhere to the seed.

624. Looser, G.
La oca (*Oxalis*) cultivada en Chile. **(The oca *Oxalis*) cultivated in Chile.)**
Rev. argent. Agron. B. Aires, 1954, **21**: 61-8, bibl. 19, illus.

The botany of *Oxalis tuberosa*, a tuberous vegetable, and the history of its localized cultivation in Chile are dealt with.

625. Shimokawa, M., and others.
Breeding of variety "Miura Radish" of *Raphanus sativus* L. I. [Japanese, with English summary 9 lines.]
Bull. hort. Sect. Kanagawa agric. Exp. Stat., 1953, No. 1, pp. 9-13, bibl. 8, illus.

The characters of the recently bred Wase Miura radish are: (1) continued root growth in winter; (2) high frost resistance; (3) reduced bolting and pithiness; (4) no pithiness after bolting; and (5) 18–20 in. root length below ground.

626. Trulevič, V. V.
Bolting of radish in the Arctic zone. [Russian.]
Agrobiologija, 1954, No. 3, pp. 128-31.

Radishes sown *in situ* outdoors under cool, long daylight conditions did not bolt and produced very good, large roots. When, however, seedlings were transplanted in the open, up to 5% of the plants bolted, and transplanting in the greenhouse caused up to 100% bolting, resulting in greatly reduced size and quality of roots. Radishes also bolted outdoors without transplanting when seeded densely in a dry, sheltered position.

627. v. Hösslin, R.
Über den Einfluss der Korngrösse des Saatgutes auf den Ertrag von Rettich und Kohlrabi. **(The effect of seed size on yield in black radish and kohlrabi.)**
Züchter, 1954, **24**: 220-3, bibl. 3.

A positive relationship was shown to exist in black radish and kohlrabi between size of seed on the one hand and earliness and total yield on the other. It is suggested that these findings may be applicable to other vegetables with a short growing season.—Staatl. Lehr- u. Forschungsanst. f. Gartenbau, Weihenstephan.

628. King, K. M., and Forbes, A. R.
Control of root maggots in rutabagas.
J. econ. Ent., 1954, **47**: 607-15, bibl. 9.

Results of 2 years' reconnaissance studies and 3 years' large-scale field experiments on control of root maggots, *Hylemyia* spp., in swedes on Vancouver Island are reported. In the experiments the following 4 main methods of treatment were used: the band and furrow methods, each involving a single application of an insecticidal dust in the soil at time of planting, and the spray and dust methods, each consisting of 2 applications to the crop, the first being made soon after emergence and the second as late in the growing period as possible. Dust applications to the crop were generally unsatisfactory. Of the chemicals tested aldrin and heptachlor were the most effective. Suggested rates per acre when rows are 3 ft. apart, by the band, furrow and spray methods, are 5, 2·5 and 5 lb. respectively for aldrin, and 5, 2·5 and 3 lb. for heptachlor. These rates apply to loam soils of average organic content. [See also *H.A.*, 24: 3900.]

629. Cruickshank, I. A. M., and Palmer, T. P.
Resistance of swede varieties to dry-rot (*Phoma lingam*) (Tode) (Desm.).
N.Z. J. Sci. Tech., Sect. A, 1954, **36**: 122-8, bibl. 15.

Forty-five lines of swedes were tested for their reaction to dry-rot in glasshouse and field trials. Many of the varieties appeared to be mixtures of susceptible and resistant plants. The varieties Weibull's Balder, Weibull's Wilhelmsburger, and a line of Wilhelmsburger Otofte of unknown origin, had a high proportion of resistant plants. [From authors' summary.]

Salad crops.

(*See also* 28, 39, 504, 505, 506, 575.)

630. Gagne, J.-B.
Le chauffage électrique des couches d'endives. **(Electrical heating of chicory beds.)**
Jardins Fr., 1954, **127**: 165-9, illus.

The economics of heating chicory beds by electricity are discussed, and compared with heating by hot water pipes.

631. Borthwick, H. A., and others.
Action of light on lettuce-seed germination.
Bot. Gaz., 1954, **115**: 205-25, bibl. 12, illus.

1. The observations of Flint and McAlister [*Smith misc. Coll.*, 1935, 94 (5): 1-11] that imbibed seed of some lettuce varieties can be promoted in germination by irradiation in the red portion of the spectrum and inhibited in the infrared were verified. 2. The action spectra for promotion and inhibition were measured in detail for wavelengths greater than 4,000 Å. Maximum sensitivity for promotion was found in the region 6,400–6,700 Å (red) and for inhibition in the region 7,200–7,500 Å (infrared). 3. Absorption of radiation in the red or in the infrared region changes the effective pigment into the infrared- or the red-absorbing form respectively. The alternation of form can be repeated many times. 4. The action spectrum for lettuce-seed germination is the same as that effective for photoperiodic control of floral initiation. The two phenomena involve the same initial photoreaction. 5. The photoreaction involves mono-molecular isomerization of the effective pigment. 6. A reaction by which the pigment changes from the infrared- to the red-absorbing form occurs in darkness. This reaction was elsewhere found to be the one by which duration of darkness is measured in photoperiodic control of floral initiation. 7. Seed of one lettuce variety, Great Lakes, that did not require radiation for germination, became sensitive to radiation when held imbibed at 35° C. [Authors summary.]—U.S. Dep. Agric., Plant Ind. Stat. Beltsville.

632. Andrew, W. T.
Seedstalk development of lettuce as affected by growth regulators, vernalization, temperature and photoperiod.
Diss. Abstr., 1954, **14**: 432-3, being *Publ.* 7155 of 84 pp.

Applications of 2,4-D were made singly and repeatedl at concentrations between 1 and 40 p.p.m. to lettuce plants. Seed-stalk development was hastened in the variety Great Lakes when the growth substance was applied to plants 94 days old; seedstalk development in 65-day-old plants of Great Lakes and Imperial 456 was significantly retarded, but no effect of 2,4-D was apparent in 65-day-old plants of the Slobolt variety. Soaking seed in solutions of 2,4-D varying from 0·1 p.p.m. to 10 p.p.m. resulted in decreases in germination rate and percentage with increasing concentration. Plants from seeds soaked in 1 p.p.m. 2,4-D before vernalization developed seedstalks more rapidly than plants from seed not treated with 2,4-D and sown dry, but less rapidly than plants from vernalized seed presoaked in water. Unvernalized seed presoaked in water or 2,4-D gave rise to seedstalks more rapidly than seed sown dry. Seed of Great Lakes, Imperial 847, and Slobolt vernalized for 16 days before sowing gave rise to earlier flowering than did unvernalized seed. Seed vernalization in moist soil was as effective as that in petri dishes. In vernalized or 2,4-D treated plants a night temperature of 60° F. accelerated seedstalk development. A photoperiod of 15 hours accelerated seedstalk development only if the germinating seed had been vernalized.

633. Majmudar, A. M.
Water relations of lettuces.
Univ. Nottingham Dep. Hort. Res. Rep. 1954, pp. 17-18.

Preliminary results from studies made in spring on the water relations of lettuces under glass suggest that plants may not require irrigation until just before harvesting, provided that the soil is deep and moist enough at planting time.

634. Lockie, G. D.
Irrigation for salad and other intensive cropping.
Agriculture, Lond., 1954, **61**: 322-8.

Aspects of the use of irrigation in intensive market gardening are discussed. The apparatus may be used not only to combat drought, but also to facilitate harvesting and cultivations, for protection against frost and overheating in frames, and to help in the control of certain pests and diseases. Careful attention must be paid, however, to crop selection, stage of growth, rate of application and type of equipment, if the installation is to be economic. Costs calculated for a 50-acre market garden at Fernhurst for 1953 amounted to £10 19s. 6d. per acre, the capital cost being reckoned as £90 and depreciation at £8 3s. 11d. a year.

635. Rich, S.
Seedling chemotherapy for the control of lettuce big vein.
From abstr. in *Phytopathology*, 1954, **44**: 503-4.

Growth substances and other chemicals were applied to healthy lettuce seedlings before planting out in a field infested with lettuce big vein. Naphthaleneacetic acid and 2,4,6-trichlorophenoxyacetic acid were the most effective, followed by indoleacetic acid, calcium chloride and zinc sulphate. NAA significantly reduced weight yields. Only zinc sulphate gave yield increases, perhaps due in part to the remedying of undetected zinc deficiency.

636. Couch, H. B.
Factors influencing percentage of seed transmission of the common lettuce mosaic virus.
From abstr. in *Phytopathology*, 1954, **44**: 485.

A considerable difference was found among individual plants of the lettuce variety Bibb in ability to transmit the common lettuce mosaic virus through their seed. Factors investigated were consistency of rate of transmission from one generation to another, and the effects of topographical position of flower head, of time and order of floral initiation and of date of infection.

637. Powlesland, R., and Brown, W.
The fungicidal control of lettuce downy mildew, caused by *Bremia lactucae*.
Ann. appl. Biol., 1954, **41**: 461-9, bibl. 2, illus.

Protection experiments carried out in the greenhouse showed that preparations of thiram, zineb, ferbam and ziram were superior to cuprous oxide and copper oxychloride preparations in controlling downy mildew of lettuce and in lack of phytotoxic effect. Tests made in winter on lettuce seedlings grown in Dutch lights showed that the best overall protection of foliage against downy mildew was given by thiram and zineb preparations. [From authors' abstract.]—Imp. Coll. Sci. Tech., London.

638. Pratt, H. K., Morris, L. L., and Tucker, C. L.
Temperature and lettuce losses.
Calif. Agric., 1954, **8** (8): 14-15.

Great Lakes lettuces were harvested between April and August and stored at various temperatures in order to determine the rate of loss of quality during storage. There was no seasonal effect, and in general trimmed and untrimmed lettuce showed the same temperature response. The rate of respiration and therefore loss of quality was reduced at low temperatures, the optimum storage temperature being 32° F.

Spinach and New Zealand spinach.

(*See also* 76, 509, 510.)

639. Geissler, T.
Ein Beitrag zur Frage der Nährstoffaufnahme von Spinat über die Blätter. (**The absorption of nutrients by spinach leaves.**)
Arch. Gartenb., 1954, **2**: 311-18, bibl. 12, illus.

Spinach plants were grown in containers without either N or K and a solution of the missing nutrient was applied to the leaves by a brush. N utilization from 0·1–0·3% NH_4NO_3 was calculated to be 100% and K utilization from 0·3% KCl to be 60%. K_2SO_4 and a 0·1% solution of KCl proved to be inferior sources of K. The study was carried out at the Institut für Gemüsebau, Grossbeeren, where experiments have been initiated on vegetable manuring by sprinkler irrigation, both in the grasshouse and in the field.

640. Jacks, H.
Seed disinfection. X. Effect of seed protectants on emergence of spinach.
N.Z. J. Sci. Tech., Sect. A, 1954, **36**: 129-33, bibl. 2.

Of 40 fungicides tested 13 gave effective protection of spinach seed against pre-emergence damping off in soil artificially inoculated with *Pythium ultimum*. Effective substances were based on the following chemicals: cuprous oxide, dichlone, phenyl mercuric dinaphthyl methanedisulphonate, methoxy ethyl mercury, ethyl mercury phosphate, thiram, ferbam, copper 8 quinolinolate, nitrosopyrazole and captan. [Author's summary.]

641. Eifrig, H.
Keimversuche mit Neuseelander Spinat, *Tetragonia expansa* Murr. **(Germination tests with New Zealand spinach.)**
Saatgut-Wirtsch., 1954, **6**: 178-80, bibl. 8, illus.

Mechanical injuries to the husk of the fruit, alternating temperatures (18° and 30° C.) and repeated drying of the fruit were found to promote the germination of *Tetragonia expansa* seed. Peat proved a very suitable medium for germination.—Landw.-Kammer Westfalen-Lippe.

Tomatoes, eggplants and capsicums.

(*See also* 26, 37, 55-60, 65, 72, 74, 394, 503, 504, 510, 517, 575, 576, 593, 703a, f, g, i, m, q, t, v, 992, 1144, 1147.)

642. Becker-Dillingen, J., and Barg, T.
Arbeiten zur Gewinnung frostresistenter Tomatenformen. **(The selection of frost-resistant forms of tomato.)**
Züchter, 1954, **24**: 252-6, bibl. 7, illus.

Preliminary work in the field and in the laboratory suggests the feasibility of increasing resistance to spring frost in tomatoes by selection. The methods and freezing chambers used in these tests are described.—Weihenstephan.

643. Becker-Dillingen, J.
Die frostresistente Tomate. **(A frost-resistant tomato.)**
Gartenwelt, 1954, **54**: 331-2, illus.

Resistance trials with a frost-resistant tomato, variety Rheinlands Ruhm, have shown that young plants hardened off at about 5° C. for 8 days could resist temperatures as low as −4° C. Young bush plants were able to resist temperatures of −5° to −6° C., and in one or two cases −8° C.

644. McGuire, D. C.
Hybrid tomatoes pay.
Hawaii Fm Sci., 1954, **3** (1): 4-5, illus.

In a recent trial in Hawaii, 3 F_1 hybrids, with a nematode resistant seed parent, outyielded the best pure line varieties, both local and introduced. Growers are urged to produce their own F_1 hybrid seed, and the steps necessary to achieve this are explained in detail with the aid of illustrations.

645. Misro, B.
The experimental production of chimeras in plants.
Sci. and Cult., 1954, **20**: 95-7, bibl. 8.

Reciprocal grafts were made of nearly all possible combinations of 10 solanaceous species. 377 (68·2%) of the grafts were successful. When well established the grafts were cut back to the point of union and adventitious buds arising from the callus were allowed to develop. Two periclinal chimaeras obtained in this way are described, the one resulting from a graft of *Lycopersicum esculentum* on *Solanum nigrum* and the other from a reciprocal graft between these species.—Centr. Rice Res. Inst., Orissa.

646. Bishop, C. J.
A stamenless male-sterile tomato.
Amer. J. Bot., 1954, **41**: 540-2, bibl. 7, illus.

A male-sterile mutant in tomato is reported, which under most conditions is completely stamenless. Rarely it develops abnormal stamens which contain viable pollen. The flowers are fertile when used as the female parent in a cross, thus indicating that the mutant may have potential value for use in producing hybrid seed. [From author's summary.]

647. Baudet, —., and others.
Études sur la tomate. **(Studies on the tomato.)**
Publ. Serv. Hort. Rabat, **11**, 1952, pp. 96, bibl. in text.

The data presented form a progress report of studies on various aspects of tomato culture carried out in Morocco since 1948. A manurial trial with the variety Sunrise emphasized the importance of sufficient P in fertilizer applications and showed that N and K applied separately or together did not noticeably affect the yield. A rotary sprinkler was used in irrigation trials with Gloire d'Alsace. Less water was used thus than by normal irrigation methods, but *Alternaria* disease was more prevalent. The water distribution did not appear to be affected by the wind. Protection of winter crops was given most satisfactorily by unlimed straw screens, neither iron screens nor limed straw screens improving earliness or yield. Winter crops of the smooth-skinned varieties Gloire d'Alsace, Ailsa Craig and Sunrise grew as well as the ribbed-skinned variety Marmand, and their yield was higher, though 4 to 5 days later, than that of Marmand. Extensive trials are being continued with varieties for autumn culture and for processing.

648. van Blommestein, J. A., and Malan, E. F.
Tomato cultivation in the Lowveld.
Fmg S. Afr., 1954, **29**: 287-94, illus.

Tomatoes are extensively cultivated during the winter in the northern and eastern Transvaal Lowveld, higher regions are more suitable for autumn crop production, while summer crops are grown in the Highveld. Rotation with sunn-hemp or velvet bean varieties is practised to keep down the eelworm population. Seed is sown in beds, and transplanting follows about 3–6 weeks later. Contour planting is recommended for easier and more efficient irrigation: irrigation over the entire ground has been shown to give better growth and yields than irrigation in the rows only. No significant yield differences have been shown between trained and untrained plants, but the former produce more marketable fruit in the early summer months. Training of winter tomato plants is not considered worth while, and pruning of the plants is not general in South Africa. The chief varieties grown are Marvel, Rutgers and Hortus 5.

649. PLOPER, J.
El cultivo del tomate en Tucumán. (**Tomato growing in Tucumán.**)
Rev. industr. agric. Tucumán 1948-52, 1952, **38**: 19-55, bibl. 1, illus.

A detailed account is given of the "tapado" method of growing early tomatoes for the Buenos Aires market in the cool Tucumán province of Argentina. For protection against frost the tomatoes are sown or planted in trenches with built-up walls topped with grass or straw. The method is also used for peppers, cucumbers and eggplants. The variety Platense covers 90% of the tomato acreage; other varieties include Marglobe, San Carlos and Bonny Best. Notes are given on acreage, location of tomato areas, nurseries, harvesting. packing, diseases, pests and costs.

650. JUNGES, W.
Zur Unterscheidung von entwicklungsphysiologisch optimaler und ertragsmässig optimaler Jarowisationsdauer bei der Buschtomato. (**The duration of the vernalization treatment for optimum development and yield in bush tomatoes.**)
Arch. Gartenb., 1954, **2**: 213-21, bibl. 9.

Vernalization of tomato seed was shown to affect number of flowers produced rather than time of flowering. The effect of the treatment is ascribed chiefly to the soaking of the seed for 24 hours prior to its exposure to a temperature of +3° C. Thirty days' cold treatment proved to be conducive to the optimum physiological development of the plants associated with the acceleration of flowering by 3–4 days and with the formation of so large a number of flowers that fruit ripening was delayed. Fifteen days' cold treatment, on the other hand, increased yields by 50% over those of the controls.—Inst. Gartenbau, Dresden-Pillnitz.

651. UŠAKOVA, E. I.
Trials on planting and sowing vegetables in groups on the square. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1954, **19** (1): 3-9, illus.

A report on planting tomatoes and onion sets and sowing cucumbers and other vegetables in groups on the square at the Gribovsk Vegetable Breeding Station since 1948.

652. SUKORCEVA, K. D.
Planting vegetables in groups on the square under irrigation. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1954, **19** (1): 15-19, illus.

Where irrigation is practised it is recommended that tomatoes and eggplants should be planted in groups of 2 and peppers in groups of 3 in a line 10 cm. apart, with a distance of 70 cm. between the groups and the same between the rows. Mechanical planting combined with watering is later followed by cultivation, during which operation the irrigation furrows are cut.

653. SALTER, P. J.
The effects of different water-regimes on the growth of plants under glass. I. Experiments with tomatoes (*Lycopersicum esculentum* Mill.).
J. hort. Sci., 1954, **29**: 258-68, bibl. 17, illus.

An investigation was made to find the effect of different water-regimes on the root development, growth and yield of the tomato under glasshouse conditions. The concept of the water-regime is explained and a description given of the instruments, apparatus and experimental procedure adopted, which enabled plants of 2 varieties of tomato to be subjected to 4 different, definable and reproducible water-regimes for a continuous period of 5 months. In the different regimes, water was not applied until 5, 35, 50 and 60% respectively of the available water had been removed from the soil at a depth of 15 cm., as indicated by soil moisture tensiometers. The timing of irrigation was thus controlled by tensiometer readings. Growth and yield of tomatoes were markedly affected by the water-regimes, maximum growth and yield being produced when the soil moisture content was maintained in the region of field capacity and progressively reduced in drier treatments. Root development, determined by sampling and examination of soil profile, was also affected, the zones of greatest concentration of roots being located at different depths under the different water-regimes. Chemical composition of the soil was also affected. [Author's summary.]—Dep. Hort., Univ. Nottingham. [For previous accounts of this work see *H.A.*, 23: 1947, 3162, and 24: 507, 2814.]

654. SALTER, P. J.
Watering tomatoes under glass.
Univ. Nottingham Dep. Hort. Res. Rep. 1954, pp. 13-16, bibl. 3.

Experiments on tomato watering were continued in 1953. Trickle irrigation, with watering when the mean tension rose to 7 cm. Hg, replaced the driest treatment of 1952. The use of this method of irrigation enabled a controlled water regime to be maintained with the minimum of trouble, and appears likely to result in higher yields than where a similar regime is maintained by hose watering. [See also *H.A.*, 23: 1947, 3162, and 24: 507, 2814.]

655. JANES, B. E.
Absorption and loss of water by tomato leaves in a saturated atmosphere.
Soil Sci., 1954, **78**: 189-97, bibl. 13, illus.

Tomato plants were grown in flasks of soil to a height of 15 to 20 cm. The roots were then sealed from the top, and the plant and container placed in a fog. The change in weight of the culture was determined at daily intervals. It was necessary to seal the plants in such a way that air pressure inside and outside was equalized and oxygen could reach the roots. Whenever an attempt was made to seal the flask completely, the change in pressure broke the seal, or the roots died. The cultures increased slightly in weight when first placed in the fog. After 3 days in the fog, there was a steady decrease in weight as a result of loss of moisture. from the soil. The moisture content of the soil was reduced from field capacity to near the wilting point during 18 days in the fog. Plants in dry soil remained alive while in the fog but grew very slowly. Plants in moist soil continued to grow while in the fog. Adventitious roots grew on the stems of the tomato plants while in the fog. The roots appeared first and were more numerous on plants in moist soil. [Author's summary.] These results failed to reproduce those obtained by Breazeale and McGeorge in which water absorbed by the leaves was exuded by the roots [*H.A.*, 23: 3175 and earlier].—Storrs agric. Exp. Stat., Conn.

656. Verkerk, K.
De invloed van temperatuur en licht op de tomaat. (**The influence of temperature and light on the tomato.**) [English summary $\frac{1}{3}$ p.]
Meded. Dir. Tuinb., 1954, **17**: 637-47, bibl. 3.

In California experiments were carried out under controlled conditions on the influence of temperature and light on tomato plants. Three combinations of day and night temperature treatments were given: it was shown that 23° C. in the day and 11° C. at night resulted in shorter stem growth, higher root weight, longer, heavier fruit trusses and larger although later yields than those in plants subjected to higher night temperatures. A reduction in light intensity showed its greatest influence on the truss: low light intensity must be combined with low temperature to produce satisfactory growth of the truss.

657. Jakuškina, N. I., and Kravcova, B. E.
The effect of uninterrupted illumination on growth and fruit formation in tomatoes. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1953, **91**: 425-8, bibl. 5.

Tomatoes, variety Lučšiĭ iz vseh [Best of All], grown in pots were given: 16 hours illumination at (1) 23° C. day and night temperatures and (2) 23° C. day and 15° C. night temperatures; and 24 hours illumination at (3) 23° C. day and night temperatures and (4) 23° C. day and 15° C. night temperatures. The plants grew and fruited best under conditions (2) of 16 hours light at 23° C. day and 15° C. night temperatures. Uninterrupted light and constant temperature (3) resulted in weak, chlorotic plants, only 3 out of 10 of which produced any fruits. The chlorophyll content of these plants was less than half that of those grown with 16 hours illumination (1), and their photosynthetic activity was greatly reduced. Their vascular system was underdeveloped and sugar content low, but their nitrogen content was high. When the temperature was reduced for 8 hours from 23° to 15° C. (4), normal plants, producing good yields were obtained, indicating that by this method tomato growing is practicable under conditions of constant light in the Far North.

658. Johnson, S. P., and Hall, W. C.
Parthenocarpy in the tomato.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 329-32, bibl. 6.

Nine varieties of tomatoes were tested for ability to develop parthenocarpic fruit under conditions of high temperatures. Variety 1388 produced parthenocarpic fruit only at temperatures above 95° F. Variety 1112B produced parthenocarpic fruit at temperatures above 88° F. The other varieties fell between these two extremes excepting Marglobe and Rutgers, which produced no fruit under the conditions of the test. [Authors' summary.]—Tex. Coll. System, College Station.

659. Kumar, K., and Rajan, A. K.
Use of growth substances in the induction of parthenocarpy in *Lycopersicum esculentum* and *Capsicum annuum.*
Curr. Sci., 1954, **23**: 94.

Phenoxyacetic acid (PAA) at 10 p.p.m. and indoleacetic acid (IAA) at 1 p.p.m. and 10 p.p.m. sprayed onto tomato and chilli flower buds emasculated at the pre-anthesis stage resulted in the formation of between 30% and 68% of parthenocarpic fruits. IAA, especially at 1 p.p.m., was rather more effective than PAA. With chillies both substances at 10 p.p.m., but with tomatoes only IAA, increased fruit size relative to that of untreated controls.

660. Kumar, K., and Rajan, A. K.
Urine-induced parthenocarpy in *Lycopersicum esculentum* and *Capsicum annuum.*
Curr. Sci., 1954, **23**: 129.

Bull, buffalo and cow urines were used at various concentrations to induce parthenocarpy in tomatoes and chillies. The highest percentage of parthenocarpic tomato fruits was produced with a concentration of 1: 500 for bull and buffalo urines and 1: 1,000 for cow urine. With chillies a concentration of 1: 300 was most effective in all cases. Some of the treatments resulted in a considerable increase in fruit size.—Hindu Univ., Banaras.

661. Carañgal, A. R., and others.
The influence of mineral nutrition on the organic acids of the tomato, *Lycopersicum esculentum.*
Plant Physiol., 1954, **29**: 355-60, bibl. 23.

In analyses of the wilt-resistant Globe tomato, formic, acetic, trans-aconitic, malic, citric, and possibly cis-aconitic acids were found to occur in roots, leaves and fruits. The gelatinous pulp of vine-ripened tomato fruits contained larger amounts of acids than the fruit wall. The effect of various ions on the concentrations of anazotic acids in tomato fruits did not seem to be a specific effect of certain particular ions, but rather an interrelated effect. During development and ripening of the fruits acetic acid decreased whereas citric acid increased and then decreased.—Ohio State Univ., Columbus.

662. Montelaro, J.
Nitrogen nutrition of tomatoes with foliar sprays of urea.
Diss. Abstr., 1954, **14**: 748-9, being *Publ.* 7896 of 107 pp.

Field and greenhouse studies on the application of urea sprays to tomato foliage were carried out over 3 years. In the early stages of growth foliar sprays were less beneficial to the plants than equal amounts of N in soil applications. Yields from plants receiving foliar sprays were comparable with those receiving soil applications of equal amounts of N. Urea was readily absorbed by the leaves. The degree of foliar injury was proportional to the amount of urea absorbed by the leaves within 3 or 4 hours of application. Magnesium sulphate, added to strong urea solutions, reduced the rate of urea absorption and so reduced foliar injury. [See also *H.A.*, 24: 2809.]

663. Hacskaylo, J.
Ammonium and nitrate nitrogen in nutrition of tomato plants on pumice and gravel substrates.
Diss. Abstr., 1954, **14**: 449, being *Publ.* 6515 of 54 pp.

Variable proportions of ammonium and nitrate ions were supplied in nutrient solution to tomato plants growing in pumice and gravel substrates. It was found that pumice was a better substrate on which to grow tomato plants than gravel, when the same nutrition was supplied. Floral primordia were initiated in the eleventh node in both substrates, and anthesis was delayed in direct relation to the ammonium-N supply. Increasing the ammonium N resulted in increased toxicity of the nutrient solution to plants on gravel, but no toxicity effects were observed in plants on pumice. The total uptake of nitrate and ammonium by plants in the gravel series varied inversely with the ammonium nitrate supply, and directly with the pH of the residual nutrient solutions.

664. Jones, L. G., and Warren, G. F.
The efficiency of various methods of application of phosphorus for tomatoes.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 309-19, bibl. 15.

Deep placement of phosphatic fertilizer, by banding under the transplants, was more efficient than shallow placement, either in bands or broadcast and disked in. The use of a 6–57–17 starter solution increased yields significantly, regardless of placement. Fertilizer and total phosphorus absorption were increased by the use of the complete starter solution. Differences in yield due to fertilizer placement were not so pronounced where the complete starter solution was used. The more efficient fertilizer placements were found to depress soil phosphorus uptake early in the season, but this situation gradually changed so that eventually the better fertilizer placements had also resulted in greater phosphorus uptake from the soil. Increasing early phosphorus uptake was shown to be more important in affecting yields than was increasing total phosphorus uptake. Late phosphorus absorption was found to have little bearing on yield. [From authors' summary.] —Purdue Univ., Lafayette.

665. Hewitt, E. J., and McCready, C. C.
The molybdenum requirements of tomato plants given different types of nitrogen supply in sand culture.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 209-13, bibl. 7.

Tomatoes were grown in sand cultures under conditions similar to those applied previously to cauliflowers [*H.A.*, 24: 434 and earlier]. N was supplied in 7 forms, with and without Mo. Visual symptoms were recorded and percentage dry matter, total dry weight, chlorophyll, ascorbic and dehydroascorbic acids and nitrate contents were determined. The results indicate that Mo is required by the tomato for growth and ascorbic acid production but is of little or no importance in chlorophyll production provided a readily assimilable N source is available. The absence or masking of all but occasional visual symptoms under Mo deficiency conditions in the absence of nitrate suggests that growth as a whole may be depressed without development of unbalanced conditions typical of certain other mineral deficiencies. Highly significant Mo × N interactions suggest that, although Mo is required by the tomato plant grown with non-nitrate sources of N, the quantitative Mo requirements or the depressive effects of Mo deficiency under these conditions may be significantly less than in the presence of nitrate. Possible effects still requiring elucidation are discussed.

666. Possingham, J. V.
The effect of molybdenum on the organic and inorganic phosphorus of plants.
Aust. J. biol. Sci., 1954, **7**: 221-4, bibl. 17.

Molybdenum, applied as sodium molybdate 2 days before sampling, had a marked effect on the phosphorus metabolism of Mo-deficient tomato plants grown in waterculture solutions. The Mo increased the concentration of organic P with a corresponding decrease in the concentration of inorganic P. It increased the yield of dry matter, the absolute amount of P and the absolute amount of organic P, but not the absolute amount of inorganic P. The concentration of total P did not change.—C.S.I.R.O., Canberra.

667. Malavolta, E., and Carlton, A. B.
Nota preliminar sôbre a distribuição do radiozinco no tomateiro. (**Note on the distribution of radiozinc in the tomato plant.**) [In Portuguese and English.]
An. Esc. sup. Agric. "Luiz de Queiroz" Piracicaba, 1953, **10**: 121-4, bibl. 5, illus.

Zn^{65} was supplied to tomato seedlings as zinc chloride and its distribution was studied 24 hours and 4 days after the fourth weekly supply.

668. Mollenhauer, R., and Smith, C. B.
Tomato plant absorption and translocation of manganese and zinc from dithiocarbamate fungicide sprays.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 297-303, bibl. 21.

This study was carried out in order to determine if plants inadequately supplied with manganese and zinc will absorb these elements from fungicide sprays. Tomato plants were grown in nutrient-solution culture in the greenhouse at low levels of Mn and Zn, and were sprayed 3 times at 10-day intervals with Manzate and Zerlate fungicides, and with distilled water as a control. Unsprayed leaves from upper and lower portions of the plant, which had been enclosed in plastic bags during spraying, were analysed chemically for the elements Mn, Zn, Fe and Cu. It is concluded that Mn from Manzate fungicide was absorbed and translocated in small quantities in the tomato plant, and that Zerlate fungicide did not furnish Zn in an absorbable or translocatable form. Leaf concentrations of Fe in the Zerlate-sprayed plants were significantly higher than in Manzate-sprayed or control plants. No explanation for this is apparent at present since spray analyses showed that Zerlate contains no more Fe than Manzate. No differences were noted between Cu concentrations in plants of the various treatments. [From authors' summary and conclusions.]—Pa State Univ. State College.

669. Matuhin, G. R., and Boĭko, L. A.
Adaptation of tomatoes to soil salinity. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **96**: 391-4, bibl. 15.

In pot experiments, 5 generations of the tomato variety Birjučekutskiĭ 416 were grown in a lightly leached chernozem salinized with van't Hoff-Richter salt solution. The first generation plants developed slowly and gave very low yields, but in successive generations growth, yield and fruit quality were improved. The chloride content of the leaves, very high on plants grown for the first time in saline soil, decreased progressively, and a similar trend was followed in the permeability of the protoplasm. A detailed study on the water regime of leaves has shown that their bound water content prior to fruit formation was greatly reduced in the first season crop. In the following generations this was increased well above that of the controls and this, it is suggested, is one of the ecolo-physiological reactions leading to increased tolerance of plants to saline conditions.

670. Bain, D. C.
Relation of staking and pruning to the incidence of blossom-end rot of tomatoes.
Plant Dis. Reptr, 1954, **38**: 721-2.

Indications are given that blossom-end rot is liable to be greater on staked, pruned tomato plants than on so-called "wild" plants, viz. those not staked but pruned once, possibly as the result of exposure of the staked plants to stronger air currents and lack of mulching.

671. Treshow, M.
The etiology, development, and control of tomato fruit tumor.
From abstr. in *Phytopathology*, 1954, **44**: 508.

Tomato fruit tumour, previously called oedema or waxy blister, may be controlled by careful handling to eliminate rubbing of fruit, processing pink or ripe fruit rather than mature greens, or by ripening the fruit at less than 18° C. [From author's abstract.]

672. Day, M. F., and Irzykiewicz, H.
Physiological studies on thrips in relation to transmission of tomato spotted wilt virus.
Aust. J. biol. Sci., 1954, **7**: 274-81, bibl. 17.

Biological data are discussed in relation to theories presented to account for the ability of larval and the inability of adult *Thrips tabaci* to transmit tomato spotted wilt virus.—C.S.I.R.O., Canberra.

673. Kovachewsky, I. C.
Die Stolburkrankheit der Solanaceen. **(The "stolbur" disease of Solanaceae.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1954, **8**: 161-6, bibl. 13, illus.

"Stolbur" disease is a widespread virus disease in south-east Europe, occurring particularly on potato, paprika, tomato, and eggplant. In paprika and eggplant the symptoms are yellowing of the leaves, accompanied by root rot and wilting. In tomato it causes "big bud". The vector of the disease is *Hyalesthes obsoletus*, which overwinters on roots of *Convolvulus arvensis*.

674. Thung, T. H.
Corky root disease of tomato caused by a virus.
VIth int. Congr. Microbiol., Rome, Sept. 1953, from abstract in *Z. PflKrankh.*, 1954, **61**: 450.

In Holland "corky root" causes severe injury to tomatoes, the symptoms of which are described. The disease, which is transmitted through the soil, appears to belong to the tobacco necrosis group. Damage occurs only when the virus invades the root through a wound.

675. Conover, R. A.
Control of bacterial spot of tomato and pepper seedlings with agrimycin.
Plant Dis. Reptr, 1954, **38**: 405-9.

In large-scale experiments excellent control of bacterial spot of tomato (*Xanthomonas vesicatoria*) was obtained with agrimycin sprays containing 200 p.p.m. terramycin. Control on pepper seedlings with agrimycin under commercial conditions was not tested, but the author considers it likely to be as effective there as on tomatoes.—Univ. Fla Exp. Stat., Homestead.

676. Lockwood, J. L., Leben, C., and Keitt, G. W.
Production and properties of antimycin A from a new *Streptomyces* isolate.
Phytopathology, 1954, **44**: 438-46, bibl. 28.

The paper includes an account of greenhouse tests with the promising new antibiotic, antimycin A-102, for the control of tomato early blight, *Alternaria solani*, and of tests on its toxicity to various vegetable species.

677. Fisher, D. E.
Internal infection of tomato seed by *Didymella lycopersici* Kleb.
Nature, 1954, **174**: 656-7, bibl. 3, illus.

Observations on naturally infected fruits and experimental results indicate that the infection of tomato seed by *Didymella lycopersici* is not solely due to external contamination by spores but also involves internal fungal invasion.—Nat. Veg. Res. Stat., Wellesbourne.

678. Kendrick, J. B., Jr., and Middleton, J. T.
The efficacy of certain chemicals as fungicides for a variety of fruit, root and vascular pathogens.
Plant Dis. Reptr, 1954, **38**: 350-3, bibl. 3.

Note on laboratory trials of 12 materials on 8 root rotting fungi, 2 agents of vascular wilt in tomato and 5 fruit pathogens.—Dep. Plant Path. Univ. Calif., Citrus Exp. Stat., Riverside.

679. Gäumann, E.
Toxins and plant diseases.
Endeavour, 1954, **13**: 198-204, bibl. 15, illus.

The mode of action of some plant diseases is discussed. Pathogenic organisms produce toxins in the host which have a short-range or long-range action. Wildfire in tobacco is an example of the former group, and produces only localized damage. The wilts are an important group of fungus diseases with a long-range action; among these tomato wilt, caused by *Fusarium lycopersici*, has been much studied. Four toxins have been isolated from this fungus grown *in vitro*, and these are relatively specific as to the organs attacked. The wilting effect produced in the tomato plant is due to an interference with the osmotic requirements necessary for turgor, and not to pathological water-loss.

680. WAGGONER, P. E.
Altering disease resistance with ionizing radiation.
From abstr. in *Phytopathology*, 1954, **44**: 509.

Exposure of tomato plants to soft X-rays can increase or decrease resistance to Fusarium wilt. [From author's abstract.]

681. ROSA, M.
Due anni di sperimentazione sulla lotta contro gli avvizzimenti precoci delle piante ortensi in provincia di Salerno. (**Two years' research on the control of early wilt in vegetables in the province of Salerno.**)
Bol. Staz. Pat. veg. Roma, 1953 (issued 1954), **11**: 169-217, bibl. 19, illus.

Previous work in various parts of Italy showed that early wilt in tomatoes was due partly to climatic and cultural factors and partly to parasites including *Heterodera marioni*, red spider, *Vasates destructor*, *Alternaria solani*, *Corynebacterium michiganense*, *Fusarium bulbigenum*, *Verticillium albo-atrum* and viruses. In 1952 and 1953 experiments of 2 types were made on tomatoes in the Salerno plain, namely, soil treatment to control animal and plant pathogens, and foliage treatment, especially with non-copper products, to discover more effective fungicides, particularly for the control of early blight. Chloropicrin was the best of the fumigants tested and zineb the best of the fungicides. Fumigation at 30 × 30 cm. was more effective than less intensive treatment. Disease-resistance tests demonstrated the great superiority of San Marzano strains to American varieties. The Lungo strain of San Marzano from a dry region had the greatest resistance to blossom-end rot. It is considered that a combination of soil sterilization and cover spraying would prolong the growth cycle by 45 days and thus ensure a larger, better-quality yield.

682. MONTGOMERY, N.
Damping-off of tomato by species of *Pythium* and its control by use of formalin dust.
J. hort. Sci., 1954, **29**: 245-57, bibl. 11, illus.

Isolations from damped-off tomato plants showed the prevalence of *Pythium debaryanum* and *P. intermedium* in a number of garden soils or composts. Both fungi can be very destructive at low temperatures and high soil moisture, but are relatively inactive at temperatures above 20° C. The characteristic mode of invasion by *Pythium* species is *via* the cotyledons, and the phase of highest susceptibility is while these are still contained within the seed coat. Control of damping-off by *Pythium* species is given by concentrated formalin dust at the stage of seed sowing, and when the seedlings are being pricked out. [From author's summary.]—Imp. Coll. Lab., Lond.

683. GREEN, R. J., Jr.
A preliminary investigation of toxins produced *in vitro* by *Verticillium albo-atrum*.
Phytopathology, 1954, **44**: 433-7, bibl. 18.

Production of certain toxic substances by *Verticillium albo-atrum* R. & B. *in vitro* was reaffirmed. Responses induced in tomato cuttings included wilting, chlorosis, and desiccation. A proteinaceous material was apparently responsible for the responses observed in the cuttings; the polysaccharide fraction induced vascular discoloration and gummosis only in the absence of the proteinaceous fraction. [From author's summary.]—Purdue Univ., West Lafayette, Indiana.

684. GREEN, R. J., Jr.
The role of nitrites in the wilt response induced by *Verticillium albo-atrum*.
From abstr. in *Phytopathology*, 1954, **44**: 490.

Tests with Bonny Best tomato seedlings did not support the suggestion by earlier investigators that the accumulation of nitrites is a significant factor in the wilt phenomenon induced by *V. albo-atrum*.

685. BIJLOO, J. D., BRAVENBOER, L., AND OOSTENBRINK, M.
Grondontsmetting bij de tomatenteelt ter bestrijding van het aardappelcystenaaltje (*Heterodera rostochiensis* Woll.). (**Soil sterilization in tomato growing to control potato root nematode.**) [English summary $\frac{1}{4}$ p.]
Meded. Dir. Tuinb., 1954, **17**: 804-10, 853, bibl. 7, illus.

Two good crops of tomatoes were harvested from a dutch-light structure after soil sterilization with steam, chloropicrin or DD. Ethylenedibromide was not a satisfactory nematocide. Para-nitrobenzylchloride gave fairly good nematode control, but had a persistent phytocidal effect, and rapid repopulation of the pests followed.

686. TARJAN, A. C.
Therapy of nematode infections of plants with 3-p-chlorophenyl-5-methyl rhodanine.
Phytopathology, 1954, **44**: 431-2, bibl. 8.

Aqueous emulsions of 3-p-chlorophenyl-5-methyl rhodanine applied at the rate of 2 g. per sq. ft. to potted tomato plants infected with *Meloidogyne incognita* resulted in complete control of these root-borne parasites. Tomato plants failed to become infected when transplanted into nematode-inoculated soil in which the chemical as a powder had been mixed at rates as low as 0·5 g. per sq. ft. of surface. Possible modes of action of the chemical against the nematodes are discussed. [Author's summary.]—Univ. Rhode Island, Kingston.

687. RAMBIER, A.
Le phyllocopte de la tomate. (**Tomato russet mite.**)
Progr. agric. vitic., 1954, **71**: 105-8, bibl. 1.

The tomato russet mite (*Vasates lycopersici*) can be a serious pest in the Mediterranean area of France where tomatoes are grown outside mainly for processing, being harvested in late summer and autumn. Serious damage, however, is not normally seen on staked plants even in areas where the fruit is grown for a late harvest; plants grown for an early harvest are not usually attacked by the mite which is seldom noticed before August. Over-irrigation is likely to lead to serious damage. Control is complicated by the late appearance of the mite when harvesting is about to begin. Dusting with sulphur, or spraying with the ethyl ester of 4,4-dichlorobenzene acid or with parachlorophenylparachlorobenzene sulphonate are recommended control measures, but, in the case of sulphur, fruit destined for processing must be washed.

688. Leiderman, L.
Efeitos de modernos inseticidas orgânicos em tomateiros. **(Effect of modern organic insecticides on tomato plants.)**
Biológico, 1954, **20**: 93-8, bibl. 4.

Eight organic insecticides were tested for toxicity to Santa Cruz tomato seedlings. All were phytotoxic, but malathion, BHC, methoxychlor and nicotine sulphate were the least so and could safely be used at the normal rates.

689. Wolfenbarger, D. O.
A comparison of dilute and concentrate sprays for control of insects of potato and tomato.
J. econ. Ent., 1954, **47**: 537-9.

In Florida in 1951-52 and 1952-53 parathion applied with zineb considerably reduced damage caused to tomatoes by the serpentine leaf miner, *Liriomyza pusilla*, tomato fruit worm, *Heliothis armigera* and fall armyworm, *Laphygma frugiperda*. There was little difference in the efficiency of dilute and concentrate sprays, the latter being applied either by a mistblower or by nozzles, but, for reasons unknown, in 1952-53 the plants receiving the high-volume treatment produced heavier yields.

690. Seledžanu, N.
On hastening the ripening of fruits. [Russian.]
Priroda, 1954, **43** (1): 71-5, bibl. 8.

A discussion from Rumania on accelerated ripening of fruits, mainly by ethylene treatment. Lemons, oranges, mandarins, apricots and peaches are stated to ripen best in a 0·02% concentration of ethylene, watermelons, plums and bananas in 0·05%, and apples, pears and quinces in a 0·1% concentration. For outdoor tomatoes 0·1% is also recommended, but for greenhouse tomatoes 0·2% proved better. Tomatoes exposed to freezing temperatures did not ripen in ethylene, and those exposed to temperatures below 10° C. ripened slowly. Most satisfactory results were obtained in ripening chambers of 85% humidity at 20° C., adequately ventilated to reduce CO_2 accumulation. Other gases which were found to induce early ripening of tomatoes were ethylene bromide, ethylene chloride, butadiene (divinyl), propylene and a petroleum by-product containing both ethylene and propylene.

691. Chetwynd, K. J.
Method study to improve packing layout.
Grower, 1954, **42**: 937-41, illus.

Studies at Fernhurst are described on improving the packhouse layout for preparing leeks for market and grading tomatoes.

692. Emmert, F. H., and Southwick, F. W.
The effect of maturity, apple emanation, waxing, and growth regulators on the respiration and red color development of tomato fruits.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 393-401, bibl. 14.

Respiration and red color formation studies were made on treated and untreated tomato fruits of various maturities. In almost all cases agreement existed between these two indices of maturity. Untreated mature green tomatoes displayed a rise in respiration rate to a climacteric peak, after which the rate declined steadily. Untreated tomatoes harvested later than the mature green stage displayed a steady downward trend in respiration. Only mature green tomatoes and possibly fruits which showed incipient red coloring were stimulated in ripening by the emanations of ripe apples. Treatment with 2,4-D, in the concentrations used, had little effect on the respiration of mature green fruits. No consistent effect was noted for the methyl ester of naphthaleneacetic acid. Waxing the stem scar area of mature green tomatoes reduced carbon dioxide output materially, while waxing over other areas of the fruit had little effect in this respect. Support was given the contention that the primary area of gas exchange in the tomato is the stem scar area, but it was also shown that a certain amount of carbon dioxide may diffuse through the skin of the fruit. [Authors' summary.]—Mass. agric. Exp. Stat., Amherst.

693. Fawcett, K. I., Gaylord, F. C., and Desrosier, N. W.
Quality of raw vs. finished product in canned tomatoes.
Stat. Bull. Ind. agric. Exp. Stat. **605,** 1954, pp. 19.

A definite relationship was found between the number of cans of high grade tomatoes obtained and the quality of the raw product. The main factor causing off-grade canned tomatoes was colour.

694. Kružilin, A. S., and Ervaljd, M. A.
The character of phasic development in plants of sweet pepper and eggplant. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **95**: 1325-8, bibl. 9.

Temperatures of over 20–22° C. are most suitable for the so-called vernalization phase in the development of eggplant and pepper. This phase starting with germination ends with the cotyledonal stage. Plants go through the so-called light phase most rapidly under conditions of a 12–15-hour day at 22–25° C. This phase ends with the appearance of the 3rd pair of leaves or first flower buds. The highest peroxidase activity occurs in the 1st and 3rd tiers of leaves, and in parts of the stem to which the cotyledons and 4th–5th pairs of leaves are attached, and is connected with phasic development. The ascorbic acid content of the older leaves is low but increases from the 5th leaf onwards. From results of these biochemical investigations it is concluded that the function of the first 4 leaves of eggplants and peppers is different from that of the later ones.

695. Posgay, E.
Füszerpaprika nagyüzemi jarovizálási módszere négy év kísérletei alapján. **(Large scale vernalization of condiment paprika based on 4 years' experiments.)** [English, French and Russian summaries.]
Növénytermelés, 1954, **3**: 47-64.

Experiments in Szeged from 1950 to 1952 have shown that vernalization of imbibed seed of sweet pepper for 10 days at 30° C. gives the best results, advancing fruit maturity by 4–5 days and increasing the average fruit weight by 5–10% and average total yield by 10–15%. In 1953 heaps containing 2–3 quintals of seed each were treated. To seed of 12% moisture content 65%, by weight, of water was added in 4 equal portions. The temperature in the heaps was brought to and maintained at 30° C., by stirring and ventilation, for 8–10 days. The vernalized seed can be sown immediately after treatment or dried and stored till required.

696. Leyendecker, P. J., Jr.
Effect of fungicides and spraying schedules upon internal mold of chile.
Plant Dis. Reptr, 1954, **38**: 32-4.

Phygon XL gave the best control of this marketing disease of sun-dried chilli (*Capsicum annuum*) in New Mexico, due primarily to species of *Alternaria*, *Fusarium* and *Hormodendrum*.—Agric. Exp. Stat., State Coll., New Mexico.

697. Fujii, T., and Itagi, T.
Studies on the cyclic setting of fruit in the egg-plant. [Japanese, with English summary $\frac{1}{2}$ p.]
J. hort. Ass. Japan, 1954, **23**: 1-8, bibl. 18.

In the Japanese variety of eggplant investigated there were 3 fruit setting cycles in the season, each consisting of a high setting period followed by a low setting period. Heavy fertilization prolonged the high setting periods and vice versa. Restricting the number of leaves delayed the first high setting period. Picking the fruits small suppressed the cycles and resulted in a high yield. The cyclic phenomenon was even observable in daily yields, but the yield cycles were less distinct than the fruit setting cycles because fruit growth was delayed by heavy bearing and accelerated by light bearing. The fruit setting cycles were due primarily to periodical variation in the number of flowers and the rate of fruit set and secondarily to the number of leaves and fruits on the plant. When the number of fruits borne exceeded the sustaining capacity of the leaf area, flower drop occurred and was followed by a reduction in flower production.

698. Krishnamurthi, S., and Subramanian, D.
Effect of 2,4-dichlorophenoxy acetic acid, on *Solanum melongena*, L.
Curr. Sci., 1954, **23**: 125-6, bibl. 1.

2,4-D applied to eggplants in paste, water spray or talc induced parthenocarpy, increased fruit set and decreased the number of days necessary for ripening. The treatments reduced fruit size, but the total yields obtained, except in the case of the talc application, showed a significant increase over the control. The effects of the method of application and concentrations used are tabulated and morphological changes observed in the parthenocarpic fruits are noted. [See also *H.A.*, 24: 2834.]

699. Chatterjee, N. Ch.
Biological control of the brinjal mealy bug and aphis by *Hyperaspis maindroni* Sic.
Curr. Sci., 1954, **23**: 133.

A note indicating that *Hyperaspis maindroni*, collected for the first time in West Bengal, may provide satisfactory control of *Phenacoccus isolitus* and *Aphis fabae* on eggplants, if no insecticides are applied.

Sundry crops.

700. Nakamura, S.
Germination of edible burdock (*Arctium lappa* L.) seeds. [Japanese, with English summary $\frac{1}{3}$ p.]
J. hort. Ass. Japan, 1954, **23**: 43-7, bibl. 8.

Dormancy in the seeds of edible burdock may last 2 years or more and is believed to be due to germination-inhibiting substances in the fruit coat. In tests germination was very effectively induced by alternating temperatures, application of thiourea, pre-soaking, treatment with concentrated sulphuric acid and partial removal of seed coat.

701. Sambamurty, K., and Sundararaj, J. S.
An instance of successful grafting between *Basella* sp. and *Talinum* sp.
Sci. and Cult., 1954, **20**: 84-5, bibl. 1.

Successful reciprocal inter-family grafts are recorded between *Talinum triangulare* (Portulacaceae) and two species of *Basella*, *B. alba* and *B. rubra* (Chenopodiaceae). When mature shoots were used as scions they flowered and set seed, though the seed proved non-viable. Where younger shoots were used as scions the plants declined before the reproductive phase was reached, due, it is thought, to the delayed effects of incompatibility. Combinations with *Basella* spp. as rootstocks declined earlier than those with *Talinum* as the rootstock.—Agric. Dep., Chepauk, Madras.

702. Soloveĭ, I. N.
Water chestnut in reservoirs of Polesie. [Russian.]
Priroda, 1954, **43** (9): 97-9, illus.

Water chestnut [*Trapa natans*] is found in Polesie, White Russia and some other parts of the U.S.S.R. in static or slow flowing waters where the depth does not exceed 2·5 m. The seed, eaten either raw or cooked, or used in folk medicine, contains 15% protein, 0·5% fat, 52% starch and 3% sugar.

Noted.

703.

a Aida, H., and Uehara, T.
Studies on forcing eggplant. I. On the use of vinyl-film houses. II. Effect of different transplanting dates. [Japanese, with English summary, $\frac{3}{4}$ p.]
Bull. hort. Branch Kanagawa agric. Exp. Stat., 1954, No. 2, pp. 41-57, bibl. 9, illus.

b Ankersmit, G. W., and van Nieukerken, H. D.
De invloed van temperatuur en wind op het vliegen van de koolzaadsnuitkever, *Ceuthorrhynchus assimilis* Payk. **(The influence of temperature and wind on the flight of the cabbage seed weevil.)** [English summary, $\frac{1}{4}$ p.]
Tijdschr. PlZiekt., 1954, **60**: 230-9, bibl. 3.

c Bremer, H.
Schokoladen- oder Braunflecken der Ackerbohnen (*Botrytis fabae* Sard.). Ein Sammelbericht. **(Chocolate spot of broad bean. A review.)** [English summary, 11 lines.]
Z. PflKrankh., 1954, **61**: 402-5, bibl. 23, illus.

d CHRISTIE, W. D.
Broccoli, brussels sprouts and turnip culture.
Hort. Stencil B.C. Dep. Agric., **17,** [undated], p. 7.

e CRALL, J. M.
History and present status of watermelon improvement by breeding.
Proc. Soil Sci. Soc. Fla. 1953, 1954, **13**: 71-4, bibl. 8.

f DAVIS, D., AND LO, C.-P.
The chemotherapeutic activity of unsubstituted heterocyclic compounds.
From abstr. in *Phytopathology*, 1954, **44**: 486.
Against *Fusarium* wilt of tomato.

g DOOLITTLE, S. P.
The use of wild *Lycopersicon* species for tomato disease control.
Phytopathology, 1954, **44**: 409-14, bibl. 44.

h GILLARD, S. O.
Commercial bean culture in Auckland district.
N.Z. J. Agric., 1954, **89**: 165-75, illus.

i GOLIŃSKA, J.
Opis rozszczepiania się krzyżówki wegetatywnej pomidora czerwonego z zóltym. **(Description of segregation of the characters in vegetative crosses of red and yellow tomatoes.)** [English and Russian summaries, 9 lines each.]
Roczn. Nauk rol. Ser. A, 1954, **68**: 507-16, bibl. 10, illus.

j GREBENŠČIKOV, I.
Zur Vererbung der Dünnschaligkeit bei *Cucurbita pepo* L. **(The inheritance of thin skin character in *Cucurbita pepo*.)**
Züchter, 1954, **24**: 162-6, bibl. 9.

k GROGAN, R. G., AND KIMBLE, K.
Fusarium wilt—a major factor in the decline and replant problem of asparagus in California.
From abstr. in *Phytopathology*, 1954, **44**: 490.
Fusarium oxysporum f. *asparagi.*

l LINSER, H., MAYR, H., AND MASCHEK, F.
Papierchromatographie von zellstreckend wirksamen Indolkörpern aus *Brassica*-Arten. **(Paper chromatography of cell-stretching indole compounds from *Brassica* spp.)**
Planta, 1954, **44**: 103-20, bibl. 23.
From cabbage and brussels sprouts.

m LOEST, F. C., AND STOFBERG, F. J.
Control of diseases and insect pests.
Fmg S. Afr., 1954, **29**: 323-30, illus.
Of tomato.

n MINISTRY OF AGRICULTURE, LONDON.
Cabbage root fly.
Adv. Leafl. Minist. Agric. Lond., **18,** amended 1954, pp. 5, illus.
Erioischia brassicae and its control.

o MINISTRY OF AGRICULTURE, LONDON.
Pea and bean weevils.
Adv. Leafl. Minist. Agric. Lond., **61,** revised 1954, pp. 3, illus.
Sitona spp. and their control.

p MINISTRY OF AGRICULTURE, LONDON.
Cabbage caterpillars.
Adv. Leafl. Minist. Agric. Lond., **69,** amended 1954, pp. 7, illus.
Cabbage moth (*Mamestra brassicae*) and cabbage white butterflies (3 *Pieris* spp.).

q PAULUS, A. O., AND POUND, G. S.
The effect of air temperature on incidence and development of the gray leaf spot [*Stemphylium solani*] and nailhead spot [*Alternaria tomato*] diseases of tomato.
From abstr. in *Phytopathology*, 1954, **44**: 502.

r PLÜGHAN, A.
Der Gemüsebau in Bulgarien. **(Vegetable growing in Bulgaria.)**
Dtsch. Gartenb., 1954, **1**: 316-19, illus.

s SALUNKHE, D. K., AND POLLARD, L. H.
A simple method to determine maturity and quality in lima beans.
Fm Home Science, 1954, **15**: 42, illus.
By microscopic examination of starch grains.

t SPEARS, J. F.
The golden nematode of potatoes and tomatoes: how to prevent its spread.
Leafl. U.S. Dep. Agric., **361,** 1954, pp. 3, illus.
Heterodera rostochiensis.

u VITTUM, M. T., AND HAMSON, A. R.
Peas for canning or freezing in New York State.
Bett. Crops, 1954, **38** (8): 13-16, 46-9, illus.
Methods for increasing pea production.

v WILCOX, J., AND HOWLAND, A. F.
The tomato fruit worm: how to control it.
Leafl. U.S. Dep. Agric., **367,** 1954, pp. 6, illus.
Heliothis armigera.

TOBACCO.

General.

(*See also* 6, 33, 54, 279, 738a, b, c, f, h, 1152, 1168, 1169, 1174.)

704. SUBBANNA, M. L.
Development of flue-cured Virginia in the Mysore State.
Indian Tobacco, 1954, **4**: 96-100, illus.

The Mysore Tobacco Company is engaged in the development of Virginia tobacco growing in the State. Its activities cover cultivation in peasants' fields, curing in its own barns, and grading, redrying and marketing at the Whitefield Grading Station. Nursery work, cultivation, grading and the export trade are briefly discussed.

Breeding and selection.

(*See also* 738d, g, l.)

705. KINCAID, R. R.
Improvement of cigar-wrapper tobacco by breeding.
Proc. Soil Sci. Soc. Fla, 1953, 1954, **13**: 88, bibl. 1.

A brief note on the new variety Dixie Shade, which has blackshank resistance equal to that of Rg, the predominant Florida variety, less susceptibility to certain leaf spot diseases and some resistance to root knot. It has a slightly greater number and width of leaves, higher yield potential and better colours. Its fire-holding capacity is slightly lower than that of Rg.

706. GIOVANNOZZI, M.
In tema di selezione dei tabacchi. (**On tobacco selection.**)
Tabacco, 1954, **58**: 243-63, bibl. 33.

A review of the early history of tobacco selection and of work in Italy before the war is followed by an account of work carried out since the war by the Istituto Scientifico Sperimentale per i Tabacchi on rustica, Kentucky, Burley, Maryland, subtropical (Resistente 142), tropical (Sumatra), Virginia Bright and Turkish tobaccos. There is a brief review of work done outside Italy.

707. JAKOVUK, A. S.
The interaction of maternal and foreign pollen in intervarietal crossing of tobacco. [Russian.]
Agrobiologija, 1954, No. 3, pp. 116-21.

Tobacco flowers were cross-pollinated with pure and mixed pollen of other varieties a few hours before, at the same time as and after pollination with their own pollen. The results indicate that in most combinations the presence of maternal pollen aided fertilization, and it is suggested that in hybrid seed production flowers should not be emasculated.

Planting and cultural treatment.

(*See also* 29.)

708. BURCEV, JU. A.
Planting *Nicotiana rustica* in groups on the square. [Russian.]
Zemledelie, 1954, **2** (3): 79-80.

Carefully cultivated *N. rustica*, grown in rows produced as high yields as plants grown in groups planted on the square, but the production cost of the row crop was considerably higher.

709. BUGAENKO, N. I., GAGI, K., AND MARKULI, V.
Winter sowing of tobacco seed. [Russian.]
Tabak, 1954, **15** (3): 10-11.

In experiments in the Kuban with dry, soaked and germinating tobacco seed sown in frames in December, the dry seed gave the best stand in the spring.

710. POPOV, M., AND ILIEV, P.
Yield increases in agricultural crops through stimulation. [Russian, with German summary.]
C.R. Acad. bulg. Sci., 1953, (issued 1954), **6** (2): 61-4.

During experiments in Bulgaria on the effect of applying various chemical stimulators to a number of crop plants it was found that soaking the roots of tobacco seedlings in 5% solution of calcium glycerophosphate for 45 min. before transplanting increased the yield of undried leaves of Oriental tobacco by 16% and of Virginia by 24·9% as compared with that of the controls.

711. POPOV, M., AND POPOV, I.
Enzymochemical studies on stimulated seeds. [Russian, with German summary.]
C.R. Acad. bulg. Sci., 1953 (issued 1954), **6** (2): 65-8, bibl. 5,

Chemical stimulation increased the amylase and catalase activity in germinating seeds of a number of crop plants. This rise in enzyme activity was maintained throughout the development of the plants and resulted in higher dry matter content and increased yields. When tobacco seed was treated with 1% potassium bromide+1% taka-diastase and 2% potassium bromide, and mahorka [*Nicotiana rustica*] seed with potassium manganate and potassium bromide, catalase activity and dry matter content were greatly increased and tobacco yields were 20% higher than those of the controls.

712. DE PERALTA, F., AND BAYBAYAN, P. L.
The effect of topping and desuckering upon growth and development of tobacco leaves under Araneta Institute of Agriculture condition.
Araneta J. Agric., 1954, **1** (4): 5-13, bibl. 4.

Topped and desuckered Simmaba tobacco plants had larger, thicker leaves than the controls and had spots (batek) on their leaves while the controls had not. Computed yields in quintals per ha. were 15 and 22 respectively in plants topped to 8 and 10 leaves, 24 in the controls, and 30 and 32 respectively in plants topped to 12 and 14 leaves.

Fertilizers.

(*See also* 1146.)

713. TOBACCO RESEARCH BOARD OF SOUTHERN RHODESIA.
Fertilizing flue-cured tobacco.
(*Publ.*) *S. Rhod. Tobacco Res. Bd*, 1954, pp. 16.

The following recommendations are made: *In the seedbed.* Add 1 lb. 4-14-4 (the N as nitrate and K as sulphate or nitrate) per 3–5 sq. yd. before sowing and follow, if necessary, by 2–3 lb. per 30 sq. yd. when the seedlings are small and again after the first pulling. *In the field.* Use N according to soil and previous experience, not less than 100 lb. phosphate and 90 lb. potash, 20 lb. magnesia, 2–3 lb. borax and 20 lb. chlorine. More detailed recommendations are then made for N for first and second year crops on sandveld and sandy loam soils and on reverted land. *Placement.* Place in 2 bands 8 in. apart one on each side of the row and parallel with it at or just below root crown level, or in a circle round each plant, or in bands across the ridge about 4 in. from the plants at or just below root crown level. *Timing.* With early planting apply at or just before planting time. With late planting part of the N and K can be withheld until 3 weeks after planting. [For previous recommendations see *H.A.*, 24: 1666.]

714. Bennett, R. R., Hawks, S. N., Jr., and Nau, H. H.
Fertilizing flue-cured tobacco for high quality and yield.
Ext. Circ. N.C. agric. Ext. Serv., **376**, 1953, pp. 16.
Fertilizing Burley tobacco for high quality and yield.
Ext. Circ. N.C. agric. Ext. Serv., **379**, 1954, pp. 16.

The authors illustrate in colour common deficiency and excess symptoms in growing tobacco. They consider how best to give optimum manuring and show the value of soil tests for determining optima with both types of tobacco.

715. French, F. L.
Fertilizer trials in tobacco seed beds.
J. Dep. Agric. Vict., 1954, **52**: 399-404, 424, illus.

A series of experiments on fertilizing tobacco seedbeds as conducted in the Murray Valley area on a sandy loam. As a result it is provisionally recommended that the following mixture be applied during the preparation of the beds for seeding: 2 oz. sulphate of ammonia, 4–6 oz. dried blood, 1 oz. superphosphate and ¾ oz. potash salts per square yard. The use of a readily soluble nitrogenous fertilizer during the time of seedling removal will help to ensure a regular supply of good seedlings.

716. Maškovcev, M. F., and Psareva, E. N.
The effect of the quantity of available forms of nitrogen on the growth of tobacco seedlings. [Russian.]
Tabak, 1954, **15** (3): 20-3.

Fertilizer experiments in frames and in the laboratory have shown that large quantities of N, in the form of both nitrate and ammonia, retard the growth of very young tobacco seedlings. The N requirement of the developing plants, however, increases, and it is thought that for optimum growth the proportion of N (as nitrates) during germination should not exceed 100 mg. per 1 kg. medium, and that just before transplanting it should be about 500–600 mg. per 1 kg. medium. Rates of available N are suggested for plants raised on suitable media provided with all the other mineral nutrients, and should be varied according to ecological conditions.

717. Maškovcev, M. F., Psareva, E. N., and Petrov, A. V.
Large scale experiments on raising tobacco seedlings. [Russian.]
Tabak, 1954, **15** (3): 23-6.

In the Krasnodar region 2 trials were conducted on raising tobacco seedlings in different media in frames. The results of both tests have shown that seedlings grown in media initially containing low concentrations of available N developed better than those grown under initially high N. In order to lower the N content of the standard tobacco seedbed media it is recommended that the amount of compost used in the mixture should be reduced, that of soil and sand proportionately increased and P and K added in available forms. After the seedlings have made a good start, liquid fertilizer treatments of ammonium nitrate and poultry manure should be applied.

718. Elliot, J. M., and Vickery, L. S.
Relation of fertilizer to quality and yield of flue-cured tobacco.
Bett. Crops, 1954, **38** (8): 17-20, 49-51, bibl. 4, illus.

In experiments at Delhi, Ontario, with the flue-cured tobacco variety Delcrest on Fox sand, heavy applications of N lowered quality, P had little effect on yield or quality and high levels of K were necessary to obtain high yields and good quality leaf. Mg included in the standard fertilizer mixture prevented deficiency of this element and beneficial effects were obtained from Cl applied to bring the leaf Cl content to 1–2%. Comparison of various rates of the standard 2-12-10 tobacco fertilizer showed that 1,000 to 1,200 lb. per acre gave the most desirable results.

719. Parikh, N. M., and Shah, C. C.
Absorption of minerals by the bidi tobacco plant.
Indian Tobacco, 1954, **4**: 86-95, bibl. 11.

The accumulation of nitrogen, phosphorus, potassium, calcium, magnesium and manganese in different parts of the bidi tobacco plant (*Nicotiana tabacum*) at different growth phases and the nicotine content of the leaf were studied at the Institute of Agriculture, Anand. Tables show the mineral contents of different organs at different seasons, accumulations per plant and per acre at different seasons, and the balance of minerals in the different organs at different seasons. Results and conclusions were: (1) the rate of absorption of minerals is different at different stages of growth; (2) the amounts of nutrients removed per acre at a spacing of 4,000 plants per acre are 95 lb. N, 41 lb. P_2O_5, 120 lb. K_2O, 114 lb. CaO, 48 lb. MgO and ½ lb. Mn; (3) leaf nicotine increases only after topping and is correlated with dry matter production; (4) between pre-ripening and harvest the contents of nitrogen, phosphorus, calcium and magnesium in the plant as a whole decrease, those of potassium and manganese increase, and nitrogen accumulates in the roots, phosphorus in the stem and potassium in the midrib and root.

Diseases.

(*See also* 274, 295, 517, 738i, 989.)

720. KANNGIESSER, W.
Eine Reaktion zur Erkennung einiger Viruskrankheiten auf Tabak. (**A reaction for the detection of virus diseases of tobacco.**)
Reprinted from *Naturwissenschaften*, 1954, **41**: 307-8, bibl. 4.

Juice extracted from the leaves of healthy tobacco plants and treated with a 10% sodium chloride solution began to flocculate after a few hours and became clear on standing overnight, while the juice extracted from diseased plants flocculated only a little and remained turbid for days.—Inst. f. angew. Chem., Hannoversch-Münden.

721. KLINKOWSKI, M.
Die Inaktivierung des Tabakmosaikvirus durch pilzliche Stoffwechselprodukte. (**The inactivation of tobacco mosaic virus by fungal metabolites.**)
Mitt. biol. Bundesanst. Berlin-Dahlem, 1954, Heft 80, pp. 162-9, bibl. 29.

The number of lesions on leaves of *Nicotiana glutinosa* infected with tobacco mosaic was significantly reduced by treatment with culture filtrates from some of the Hymenocetes and other fungi tested.—Inst. f. Phytopath, Aschersleben.

722. HOLMES, F. O.
Preventive and curative effects of thiouracil treatments in mosaic-hypersensitive tobacco.
From abstr. in *Phytopathology*, 1954, **44**: 492-3.

Pretreatment with thiouracil mitigated the effects of subsequent inoculation. If treatment was not applied until just after primary lesions appeared, almost all the plants showed no further disease.

723. BANCROFT, J. B., AND POUND, G. S.
Effect of air temperature on multiplication of tobacco mosaic virus in tobacco.
From abstr. in *Phytopathology*, 1954, **44**: 481-2.

TMV concentration showed a cyclic phenomenon in a susceptible variety grown at 4 different temperatures, namely, 16, 20, 24, and 28° C. In a resistant variety resistance was expressed at 16 and 20° C., virus multiplication being low at these temperatures, and breaking down at 22° C.

724. BERCKS, R.
Untersuchungen über Änderungen des Virusgehaltes in Tabakpflanzen während der Vegetationsperiode. (**Changes in virus content of tobacco plants during the vegetative stage.**)
Phytopath. Z., 1954, **22**: 215-26, bibl. 13.

After inoculation with potato virus X, the virus content of tobacco plants increased to a maximum, at a rate dependent on growth conditions of the plants. Old leaves soon showed a sharp decline in content, while younger developing leaves had a relatively high virus content. At flower initiation an increase in virus content was observed, but there was a general decrease after flowering. In experiments comparing 2 methods of sap extraction, there was no difference in the amounts extracted from old leaves. More virus was extracted from young leaves by a homogenizer than by a pressure extractor.

725. PERUCCI, E.
La lotta antiafidica per via sistemica nelle colture di tabacco sotto garza. (**The control of aphids on shade-grown tobacco with systemic insecticides.**)
Tabacco, 1954, **58**: 279-304, bibl. 19, illus.

For the control of *Myzus persicae* in shade-grown tobacco it is recommended that a single application of 0·1 l. of 0·1% systox (equivalent to 35 hl. per ha.) be made at the base of each plant in the crop as soon as the aphids appear.

726. ANON.
Ounce of prevention for tobacco.
Agric. Res., 1954, **3** (4): 6-7, illus.

New developments in the control of tobacco diseases are briefly reviewed. Almost complete control of blue mould and wildfire was obtained by spraying infected beds with streptomycin sulphate at 200 p.p.m. A new variety for flue-curing, Dixie Bright 101, is resistant to black shank, bacterial wilt and fusarium wilt, and is low in nicotine. A new Burley variety, resistant to root rot, wildfire and mosaic, is envisaged.

727. GROSSO, J. J.
Control of tobacco blue mold by antibiotics.
Plant Dis. Reptr., 1954, **38**: 333.
MILLER, P. R. (GROSSO, J. J.).
Control of tobacco blue mold by antibiotics.
Agric. Chemls, 1954, **9** (9): 77.

A series of greenhouse experiments was carried out by the U.S. Department of Agriculture to determine the fungicidal value of various antibiotics in the control of blue mold (*Peronospora tabacina*) of tobacco. Of 10 antibiotics used in 0·01% aqueous spray solutions, only streptomycin sulphate gave a control comparable to that obtained with dithane. In a further experiment, streptomycin sulphate was used in 0·02%, 0·01% and 0·005% solutions. The 2 higher concentrations gave far better control than dithane, the percentage fungus-damaged leaves being 1·1 and 5·2 for streptomycin, 12·7 for dithane and 50 for the controls. The lowest concentration of streptomycin was unsatisfactory, giving 19·4% leaf damage.—Agric. Res. Serv., Beltsville, Md.

728. RILEY, E. A.
Anthracnose: A serious disease of tobacco nurseries in Northern Rhodesia caused by *Colletotrichum tabacum* Böning.
Trop. Agriculture Trin., 1954, **31**: 307-11, bibl. 2, illus.

Anthracnose, a serious leaf and stem blight of tobacco seedlings caused by *Colletotrichum tabacum* Böning, is described. In contrast to the disease as it occurs in Germany, in Northern Rhodesia it is apparently soil- and wind-borne rather than seed-borne. Reduction of the seeding rate, seed treatment and spraying the seedlings frequently with bordeaux mixture have failed to check the disease effectively. [Author's summary.]

729. Heggested, H. E., and Clayton, E. E.
Control of tobacco wildfire with streptomycin sulfate.
Plant Dis. Reptr, 1954, **38**: 661-5.

Streptomycin sulphate gave excellent control of wildfire (*Pseudomonas tabaci*) in tobacco plant beds. Spray treatments were better than drench or dust treatments. The best results followed the spraying of streptomycin at 200 and 400 parts per million. It gave indication of being effective as an eradicant as well as a protectant. These experimental results were supported by small scale experience of growers.—Tobac. Res. Stat., Greeneville, Tenn.

Nematodes.

(*See also* 738j, k.)

730. Wallace, A. T.
An association between narrow leaves and root-knot nematode resistance in flue-cured tobacco.
Agron. J., 1954, **46**: 468-9, bibl. 6.

Selection of wide-leaved, root-knot nematode-resistant varieties of flue-cured tobacco has been hindered by a close association of high resistance and narrow leaves. The genetic variances estimated indicate that wide-leaved nematode-resistant strains can probably be isolated. [From author's summary and conclusions. See also 738k.]

731. Philip, A., and Pal, N. L.
The rootknot nematode (*Heterodera marioni* Goodey) on tobacco.
Indian Tobacco, 1954, **4**: 78-83, bibl. 6.

Symptoms, type of injury, brief notes on studies in various countries on biology and control.

732. Lownsbery, B. F., and Peters, B. G.
The relation of the tobacco cyst nematode to tobacco growth.
From abstr. in *Phytopathology*, 1954, **44**: 497.

Examples are given of the superior growth and weight of tobacco plants in soil treated with dichloropropene-dichloropropane compared with that in untreated soil containing encysted *Heterodera tabacum* larvae.

733. Lucas, G. B., Sasser, J. N., and Kelman, A.
The effect of root-knot nematodes on the expression of granville wilt resistance in tobacco.
From abstr. in *Phytopathology*, 1954, **44**: 497.

Experiments indicate that granville wilt severity is increased in granville-wilt-resistant tobacco growing in soil infested with both *Meloidogyne incognita* var. *acrita* and *Pseudomonas solanacearum*.

Curing.

734. Perucci, E.
Il colore nei tabacchi subtropicali da fascia. **(Colour in subtropical wrapper tobacco.)**
Tabacco, 1954, **58**: 307-36, bibl. 3.

In curing shade-grown, subtropical wrapper tobacco it is important to avoid any yellowing and to obtain an even, iron-grey colour which, on fermentation, will turn to the light colour demanded by the market. Air-curing practice has not yet overcome the disadvantage —met with in certain areas and varieties—of colour variation, which fermentation reduces but does not eliminate. The old practice of midrib incision—done by hand with a special tool—is recommended as a means of hastening the drying of the midrib and thus minimizing yellowing of the leaf blade. It does not injure the blade, is not expensive, aids in the production of an even colour without pinkish spots and halves the curing period.

735. Weybrew, J. A., and others.
Curing tobacco with anthracite.
Tech. Bull. N.C. agric. Exp. Stat., **102**. 1953, pp. 16.

Premature adoption of anthracite open flue curing led to spotting and abnormal aroma in tobacco and consequent refusal on the market. Trials at Oxford, N.C., now show that, during early curing and up until the time that the web part of the leaf is essentially dry, tobacco is susceptible to spotting from sulphur dioxide in concentrations that are likely to prevail in a curing barn in which the products of combustion of anthracite are being released. Trials have been made with 3 types of anthracite curer, namely, the open flue unit, the closed system and the dual (closed-then-open) system. None gives entirely satisfactory results and further work is envisaged. Meantime the recommendation still holds good not to use any curing system which liberates sulphur dioxide into the curing atmosphere. [See also *H.A.*, 24: 1694.]

736. Scarascia-Venezian, M. A., and Giovannozzi-Sermanni, G.
Ricerche analitiche su *Nicotiana tabacum* con cromatografia su carta. I.—Variazione degli zuccheri durante il ciclo vegetativo di quattro varietà. **(Paper-chromatographical analyses of *Nicotiana tabacum*. I. Variation in sugars during the growth cycle in four varieties.)**
Tabacco, 1954, **58**: 264-78, bibl. 25, illus.

The sugars present in four cigarette varieties were determined in dormant and germinating seeds, in seedlings and in leaves at various phases in the growth cycle.

737. Širjaev, A. I.
Change of quality of the tobacco raw material Djubeka 44 variety 3A during ageing and seasoning. [Russian.]
Tabak, 1954, **15** (3): 58-9.

When Djubeka 44 variety 3A was stored for 6, 12, 18, 24 and 30 months after fermentation, its nicotine and carbohydrate contents were reduced and aroma increased. The protein content altered only slightly. Changes occurring in the quality of 7 manufacturing varieties stored for 1, 3 and 5 months varied. The work with material from different botanical and manufacturing varieties is being continued.

Noted

738.
a Atygalle, A. B.
Ceylon's cigarette tobacco industry.
Trop. Agriculturist, 1954, **110**: 30-2.

b BENNETT, H., AND PEARMAN, R. W.
Flue-cured tobacco from the Gold Coast.
Colon. Plant Anim. Prod., 1954, **4**: 162-5.
Samples, though not without merit, did not meet U.K. requirements.

c BENNETT, H., AND PEARMAN, R. W.
Burley and Virginia tobacco from Cyprus.
Colon. Plant Anim. Prod., 1954, **4**: 166-8.
Samples not yet up to U.K. market requirements.

d BOLSUNOV, I.
La création de variétés de tabac sans bourgeons axillaires et sa réalisation pratique. **(Breeding tobacco varieties without axillary buds.)**
Rev. int. Tabacs, 1954, **29**: 147-53, 157.
Experiments with varieties of *Nicotiana tabacum* and *N. rustica*.

e CLARK, C. M., AND BROWNING, W.
Organization of the looseleaf tobacco auction market.
Bull. Ky agric. Exp. Stat., 1953, **599**, pp. 94, illus.

f KADAM, B. S., AND KRISHNAMURTY, T.
Bidi tobacco.
Mysore agric. Calendar, 1954, 1954, pp. 15-18.
Cultural practices and processing.

g KADAM, B. S., AND OTHERS.
A crumpled dwarf mutation in tobacco.
Sci. and Cult., 1954, **20**: 91-2, bibl. 2, illus.
Including anatomical features associated with crumpling.

h PATEL, M. S.
Bidi tobacco industry in India.
Indian Tobacco, 1954, **4**: 64-77, illus.
Culture of *Nicotiana tabacum* for bidi tobacco, marketing, manufacture and exports.

i POWERS, H. R., JR.
The mechanism of wilting in tobacco plants affected by black shank.
Phytopathology, 1954, **44**: 513-21, bibl. 13, illus.
See *H.A.*, 23: 2012 for an abstract of a short version of this paper.

j DE QUERQUIS, F.
L'*Heterodera marioni* ed i suoi danni ai tabacchi orientali nel Salento. Nuovi mezzi per combatterla. **(*Heterodera marioni*: the damage it causes to Turkish tobacco in Salento and new methods of control.)**
Tabacco, 1954, **58**: 337-45, illus.
Soil injection with Shell DD gave complete control.

k WALLACE, A. T., AND CLARK, F. A.
Breeding flue-cured tobacco for root-knot resistance and desirable leaf type.
Proc. Soil Sci. Soc. Fla., 1953, 1954, **13**: 83-7, bibl. 1.

l WIJERATNE, W. M.
Seed production of cigarette tobacco.
Trop. Agriculturist, 1954, **110**: 32-5.
Advice for Ceylon growers.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

Culinary and spice plants.

(*See also* 1146.)

739. ANON.
The development of spice cultivation in India.
World Crops, 1954, **6**: 423.

Notes on production of black pepper, cardamoms, ginger, turmeric, cashew nuts and lemongrass oil, and suggestions for expansion based on a report by the Indian Spices Inquiry Committee.

740. MÜHLE, E., AND KÖNIGSMANN, E.
Zur Frage der Kümmel"vergrünung". **(On phylloidy in caraway.)** [English summary, 10 lines.]
Z. PflKrankh., 1954, **61**: 396-402, bibl. 10, illus.

Phylloidy of caraway, an illustrated description of which is given, was shown to be due to infestation by the mite *Aceria carvi* (*Eriophyes peucedani* var. *carvi*). The trouble, which is often accompanied by malformations of the foliage, renders the flowers sterile and causes considerable losses in Germany at present. Another type of phylloidy, not parasitic in origin, was also encountered occasionally.—Univ. Leipzig.

741. MAYNE, W. W.
Cardamoms in south western India.
World Crops, 1954, **6**: 397-400, illus.

Cardamom, *Elettaria cardamomi*, occurs throughout the monsoon forests of south India from south Travancore to north Mysore at elevations between about 2,500 ft. and 4,500 ft. The area under the crop is now about 100,000 acres, the greater part of which consists of plantations and small holdings employing similar cultural methods. The plant is propagated by division or seed and is planted out in shallow pits 6–8 ft. apart. The main cultural operations consist of shade management and weeding and, more recently, pest and disease control. The most important pest is a species of thrips, which can be effectively controlled by BHC. A virus disease is kept in check by roguing. Harvesting, yields, drying, classification and uses are outlined.

742. BAYTOP, T.
De la composition chimique de la racine et du suc de réglisse d'Anatolie. **(Root and sap composition of *Glycyrrhiza glabra* in Anatolia.)** [German summary, 4 lines.]
Maveg., 1954, **1**: 369-71, bibl. 5.

Several varieties of *Glycyrrhiza glabra* grown in Anatolia were found to have a higher liquorice content than Spanish or Italian plants. Data on root and sap composition are tabulated.

743. Puri, B., and Seshadri, T. R.
Survey of anthoxanthins: Part V—Colouring matter of liquorice roots.
J. sci. industr. Res., India, 1954, **13B**: 475-80, bibl. 16.

The yellow colour of liquorice roots [*Glycyrrhiza* spp.] is due to the presence of iso-liquiritin. This compound is the only anthoxanthin component of fresh roots and undergoes partial conversion into liquiritin during drying and storage.

744. Calpouzos, L.
Botanical aspects of oregano.
Econ. Bot., 1954, **8**: 222-33, bibl. 43, illus.

Oregano has become an important culinary herb in America. The plants sold as oregano are species of *Lippia*, usually *L. graveolens*, from Mexico, or species of *Origanum* from the Mediterranean. Thus the term "oregano" denotes the spice and not the plant.

745. David, P. A.
Pollination of vanilla flowers by hand.
Philipp. Agric., 1953, **37**: 301-5, illus.

Pollination of the vanilla flower seldom occurs naturally and must be carried out by hand for a satisfactory crop. At the College of Agriculture, Los Baños, hand selfing is done between 7 and 9 a.m. when the flowers are open and the stigmas receptive. The petals of a pollinated flower wither but persist, giving an indication of success.

Drug plants.

(*See also* 34, 63, 801c, j, l–o, s, u, v, 1017.)

746. Arthur, H. R., and Hui, W. H.
Products from some plants of Hong Kong.
J. chem. Soc. Lond., 1954, pp. 2782-4, bibl. few in text.

The leaves of the following plants used in Hong Kong for medicinal purposes have yielded:—Loquat, a mixture of triterpine acids, including ursolic acid and a little oleanolic acid; *Rhododendron simsii*, ursolic acid and the flavanone matteucinol; *Allamanda cathartica* and *Rhododendron pulchrum*, ursolic acid but no matteucinol; and guava, β-sitosterol.—Univ. Hong Kong.

747. Petelot, A.
Les plantes médicinales du Cambodge, du Laos et du Viêtnam. Tome III. (**Medicinal plants of Cambodia, Laos and Vietnam. Vol. III.**)
Arch. Rech. agron. pastor. Viêt-Nam, **22**, 1954, pp. 347.

Amarantaceae to Selaginellaceae, and supplement. Descriptions are given of each plant, its uses and useful content.

748. Feuell, A. J.
Aloe juice from St. Vincent, B.W.I.
Colon. Plant Anim. Prod., 1954, **4**: 168-70.

Aloes of the Curaçao type are abundant in the Grenadines (small islands between St. Vincent and Grenada), and the yield per acre has been estimated at 150 lb. gum which can yield 35 lb. aloin. A sample of partially concentrated aloe juice examined contained a satisfactory aloin content, but for commercial development further concentration to produce solidification would be necessary.

749. Subrahmanyan, V., Sastry, L. V. L., and Srinivasan, M.
Asafoetida.
J. sci. industr. Res., India, 1954, **13A**: 382-6, bibl. 29.

Asafoetida, a gum resin from *Ferula* spp., is obtained as an exudation from decapitated roots and rhizomes of plants about 4 years old. It is used as a condiment in India and Persia, and also medicinally. Its composition is discussed. Samples from a local market showed great variation. The authors conclude that present purity standards are unsatisfactory and need clarifying, and that further investigations into the therapeutic action of asafoetida should be made.

750. Šebek, S.
Septoria digitalis Passer. jako původce nové choroby náprstníku vlnatého. (***Septoria digitalis* as the causal agent of a new disease of *Digitalis lanata*.**) [Russian and German summaries.]
Preslia, 1954, **26**: 285-94, bibl. 5, illus.

For control seed disinfection [method not specified], destruction of diseased plants, deep ploughing and crop rotation are recommended.

751. Chatterji, S. K., Sharma, V. N., and Dhar, M. L.
Chemical examination of the root bark of *Melodinus monogynus* Roxb.: Part I.
J. sci. industr. Res., India, 1954, **13B**: 546-9, bibl. 5.

A bitter β-glucoside and 2 sterols have been isolated from the root bark of *Melodinus monogynus* which yields a fibre as well as an antimalarial drug. The glucoside, provisionally named melodin, yields on hydrolysis the aglucone, melodinidin.

752. Kuzin, A. M., and Merenova, V. I.
Biosynthesis of opium alkaloids, tagged with radioactive carbon. [Russian.]
Biohimija, 1954, **19**: 616-18, bibl. 2, illus.

C^{14} was applied to *Papaver somniferum* by 3 different methods to study the biosynthesis of the opium alkaloids, morphine, codeine and narcotine.

753. Djerassi, C., and others.
Alkaloid studies. IV. The isolation of reserpine, serpentine and ajmaline from *Rauwolfia heterophylla* Roem. and Schult.
J. Amer. chem. Soc., 1954, **76**: 4463-5, bibl. 23.

It has been established that reserpine, the active hypotensive and sedative principle in the Indian drug plant *Rauwolfia serpentina*, is also present in the Mexican and Guatemalan species *R. heterophylla*. Serpentine and ajmaline have also been isolated from *R. heterophylla* and the presence of γ-sitosterol and sucrose has been noted.

754. Monachino, J.
Rauvolfia serpentina.
Gdn J. N.Y. bot. Gdn, 1954, **4**: 152-3.

To conform with the International Code of Botanical Nomenclature the genus should be spelled *Rauvolfia* and not *Rauwolfia* as is commonly done at present. A brief historical account of the important drug plant *R. serpentina* is followed by a botanical description of the shrub. A much more detailed account will appear shortly in *Economic Botany*.

755. Anon.
Source, characters and properties of *Rauwolfia serpentina.*
Chemist and Druggist, 1954, **162**: 214-16, bibl., illus., from abstr. in *Trop. Abstr.*, 1954, **9**: 644.

Rauwolfia serpentina (*Ophioxylon serpentinum*) grows throughout India at altitudes above 4,000 ft. Collection of the plant and its roots is seasonal. It is used for medicinal purposes in India and considerable quantities used to be exported, but there is now a ban on the export of the crude drug. Information is given on the alkaloids and on the chemical structure of the sedative reserpine.

756. Semenova, M. N.
Two new alkaloid plants.
Bot. Zurnal., 1954, **39**: 443.

The scopolamine content of *Scopolia tangutica* was found to be considerably higher than that of *S. carniolica*, the most important source of this alkaloid in the U.S.S.R. The second new species examined, *S. sinensis*, proved uninteresting.

757. Semenova, M. N.
***Scopolia tangutica*—a new alkaloid plant.** [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **96**: 825-7, bibl. 8, illus.

Analyses have shown that the roots of *Scopolia tangutica* at the beginning of flowering (9 June) contained 2·6% alkaloids. The aerial parts at that time contained 2·92% alkaloids, but later this was reduced, and when the flowers were set (11 July) it amounted to only 0·5%. The alkaloids identified were: hyoscyanine, atropine and *l*-scopolamine. The possibility of obtaining scopolamine and atropine from the aerial parts of *S. tangutica* is of special interest, because with other species of *Scopolia* the roots are used for this purpose.

758. Govindachari, T. R., Pai, B. R., and Nagarajan, K.
Chemical examination of *Tylophora asthmatica.* Part I.
J. chem. Soc. Lond., 1954, pp. 2801-3, bibl. 3 in text.

Two alkaloids, tylophorine and tylophorinine, have been isolated from the perennial climber *Tylophora asthmatica.* A flavone also isolated from the plant has been identified as kaempferol.—Presidency Coll., Madras.

Essential oils.

(*See also* 801f, o, q.)

759. Mariotti, A.
Essais de distillation de plantes à parfums à l'île de Maurice. **(Experimental distillation of essential oil plants in Mauritius.)**
Rev. agric. Maurice, 1954, **33**: 124-31.

Soil studies and experimental distillations in Mauritius showed that the island is not very suitable for the culture of vetiver but that patchouli merits further trial. Analytical data are given.

760. Camporese, R.
La coltura della lavanda sui Colli Euganei. **(Lavender growing in the Euganei Hills.)**
Riv. Ortoflorofruttic. ital., 1954, **37**: 289-92.

Since the phylloxera invasion of the Euganei Hills in Venezia began in 1929 many vineyards in this area have been abandoned and much of the poorer land remains uncultivated to this day. Such land requires to be planted to a hardy shrubby crop and then to herbaceous crops before vines can be planted again. *Lavandula latifolia* and the fragrans variety of *L. officinalis* have been introduced and tested. Notes are given on the latter's environmental and soil requirements, propagation by cuttings, planting out, cultural practices, and harvesting, and on the economics of lavender growing in the Euganei Hills.

761. Spoon, W.
Citroengras-olie of lemongrass-olie uit Suriname. **(Lemongrass oil from Suriname.)** [English summary 1 p.]
Surinaam. Landb., 1954, **2**: 92-7, reprinted as *Ber. Afd. trop. Prod. kon. Inst. Tropen*, **244**, 1954, pp. 6, bibl. 8, illus.

In Surinam, a West Indian type of lemon grass (*Cymbopogon citratus*) was grown for experiments on oil extraction. Plantation-extracted oil, when analysed, contained only 60–65% of citral. Laboratory extraction and analysis of oil from freshly cut grass showed the citral content to be much higher, 72-78%. The quality of the oil improved as the plants became older.

762. Menon, A. K.
Cultivation of patchouli as an inter-crop in coconut gardens.
Bull. Indian centr. Coconut Cttee, 1954, **8**: 25-9, bibl. 7.

The use of patchouli as an inter-crop in coconut gardens is proposed. Notes are given on culture, yields and distillation in Malaya and elsewhere. The prospects for developing the patchouli oil industry in India are discussed.

763. Langston, R., and Leopold, A. C.
Photoperiodic responses of peppermint.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 347-52, bibl. 3.

A study was made of the photoperiodic responses of peppermint (*Mentha piperita*, L.). Night interruption studies verified that peppermint is a long day plant. The critical day-length for photoperiodic response lies between 16 and 18 hours. Gross morphological changes occur during and following photoinduction. Variations in light intensity over a broad range have no appreciable effect on the photoperiodic response and its accompanying morphological changes under the conditions of this study. Length of day and light intensity are important factors in flower development as distinguished from floral differentiation. Fresh weight increases were attributed to the photoinductive mechanism. The greater the length of day, the greater the number of oil glands per unit of the lower epidermis. Under the conditions of this study no measurable oil quantities could be obtained in daylengths of 14 hours or less. [Authors' summary.]—Purdue Univ., Lafayette, Ind.

Fibres.

(*See also* 801d, i, 1146.)

764. Pesante, A.
Anomalie di sviluppo della canapa (*Cannabis sativa* L.) causate da diserbanti selettivi. **(Abnormalities in hemp (*Cannabis sativa*) caused by selective herbicides.)** [English summary 8 lines.]
Ann. Sper. agrar., 1954, **8**: 1513-20, illus.

Abnormalities caused in hemp by a 2,4-D herbicide accidentally applied were stunting, the growing together of the petioles of the 2 apical leaves into a tube enclosing the terminal bud, and incomplete differentiation of the tissues, especially of the fibres of the cortex.

765. Formisano, M.
Antiche e moderne vedute sulla macerazione della canapa. Osservazioni e rilievi. **(Old and new views on hemp retting.)**
Ann. Fac. Agrar. Portici, 1951-53 (issued 1954), **20**: 58-89, bibl. 225.

This review gives information on the botanical characters of *Cannabis sativa* and the history of its cultivation, natural and artificial methods of retting, factors affecting retting (environment and soil in which the hemp was cultivated, stage at which harvested, method of harvesting, interval before treatment, quality of the hemp, type of tank, nature, quantity and quality of the water used, position of the bundles in the water, duration of retting), the microbiological processes involved, and chemical reactions during retting. A much deeper knowledge of the complex microbiological processes is necessary before a really satisfactory method of retting can be developed.

766. Waite, B. H.
Vascular disease of abacá or manila hemp in central America.
Plant Dis. Reptr., 1954, **38**: 575-8, bibl. 10.

The disease, due to *Fusarium oxysporum* f. *cubense*, is described. It is suggested that proper selection and the planting of resistant varieties offer the best protection against it.—United Fruit Co., La Lima, Honduras.

767. Willimott, S. G.
Ramie fibre: its cultivation and development.
World Crops. 1954, **6**: 405-8, bibl. 14, illus.

This general account of ramie growing deals with its history, modern development and its requirements, properties and uses, climate, varieties, soils, propagation, planting, fertilizers, cultivation, harvesting, processing, pests and diseases and yield.

768. Popov, I.
Biochemical studies on ramie (*Boehmeria nivea*). [Russian, with German summary.]
C.R. Acad. bulg. Sci., 1953 (issued 1954), **6** (2): 69-72, bibl. 4.

The catalase and peroxidase activity and vitamin C, dry matter and protein contents were studied in ramie plants at different stages of growth. Further, the feed value of leaves and young stems was established, and it was found that the residue after decortication and ensiling with green fodder maize also provides satisfactory fodder.

Hops.

(*See also* 360, 511, 801k, 1168, 1169.)

769. Osvald, V., and others.
O možnosti skupinového výskytu dvoudomých rostlin, speciálně chmele, podle pohlaví. **(The tendency for male and female hop seedlings to occur in groups.)**
Preslia, 1954, **26**: 27-32.

Observations made since 1948 in a seedling hop garden revealed a tendency for male and female hops to occur in groups. This suggests that environment may influence sex differentiation during the ontogenesis of hop seedlings.

770. Beard, F. H., and Jary, C. L.
The new varieties: A summary of the present position.
Annu. Booklet Ass. Grs New Var. Hops, 1954, 1954, pp. 4-9.

The new English varieties are classified in 5 categories: (1) varieties in definite demand, namely, Northern Brewer, John Ford, Pride of Kent, Brewer's Gold, and Bullion; (2) varieties with possible demand but no particular recommendation for growers; (3) good growers' varieties with limited or doubtful brewing demand; (4) wilt-tolerant varieties, namely, Keyworth's Midseason, Keyworth's Early, Bramling Cross, and 1147; and (5) varieties definitely not recommended. The 1953 valuation, brewing demand, cropping capacity and general characters of each are given. [See also *H.A.*, 24: 4041.]

771. Jary, C. L.
The spread of progressive verticillium wilt of hops.
Annu. Booklet Ass. Grs New Var. Hops 1954, 1954, pp. 17-19.

Nearly 200 hop farms, representing more than a quarter of those in south-east England and nearly a fifth of the total in the whole country are affected by progressive wilt. The only method of control is replanting with wilt-tolerant (resistant) varieties. Of the 2,500–3,000 acres infected some 600 have already been replanted with the existing wilt-tolerant varieties but no further extension of these is called for, and other suitable varieties are not yet available on the scale necessary to meet requirements. It is considered that the solution of the wilt problem is in sight but that it will not come into operation on a substantial scale for about 10 years.

772. Hops Advisory Committee.
Institute of Brewing hop trials: 1952 crop.
J. Inst. Brew., 1954, **60**: 414-19.

Five wilt-tolerant hops were tested as copper hops on the brewery scale and four were tested in the miniature brewery; the results of the two series of tests showed remarkable agreement. On the basis of this one-season trial (spring and autumn brews), it appears that, although the variety 1147 is preferred to the other wilt-tolerant varieties available on a commercial scale (OR55 and OJ47), it is not of outstanding merit. The most promising of the other varieties tested was D1, which was considered suitable at 25% replacement (and in some cases up to 100%) by all who tried it. The varieties OT48, C2 and D5 also received useful, though not unanimous, support as copper hops. For dry hopping pale ales, D1 was considered satisfactory by 4 out of 5 brewers who tested it, but favourable and unfavourable reports on the other experimental hops were almost equally divided. [Author's summary.]

773. KELLER, K. R., AND MAGEE, R. A.
The effect of application rates of nitrogen, phosphorus, and potash on some chemical constituents in two varieties of hops.
Agron. J., 1954, **46**: 388-91, bibl. 10.

Applications of N, P and K were given to Fuggles and Late Cluster hops in 1952 and 1953. Yields were significantly increased by applications of 100 lb. N alone or with 100 lb. phosphate, and 150 and 300 lb. potash. Strobile samples of Fuggles showed no differences in quality factors caused by fertilizer treatments. In Late Cluster, however, the application of 100 lb. N caused a significant decrease in the percentage of total soft resin content, while 300 lb. of K caused an increase in the percentage of total soft resin content and beta fraction and a decrease in the ratio of alpha acid to total soft resin content.

774. BONNET, J., AND COPPENS, R.
L'absorption des éléments nutritifs par le houblon. **(The absorption of nutrient elements by hops.)**
Bull. Inst. agron. Gembloux, 1954, **22**: 3-9.

Dry hop material has been analysed during the growing season for mineral content and the results are tabulated. Varieties analysed in 1950 were Kent, Hybrid 5/69, Tettnang, Hallertau VN.14, Hallertau Wambacq, Fuggles and Fuggles Poperinge; in 1952 Tettnang and Hallertau were analysed. Results obtained confirmed those of previous years [see *H.A.*, 18: 2037 and 21: 815, 3783]. A final table summarizes results, and gives the average uptake of nutrient elements by 7 varieties.

775. BLATTNÝ, C., AND OSVALD, V.
Přenos viros chmele (*Humulus lupulus* L.) na potomstvo semenem. **(Seed transmission of the viruses of hops (*Humulus lupulus*.)** [French and Russian summaries.]
Preslia, 1954, **26**: 1-26, bibl. 7, illus.

Several hop virus diseases are transmissible by seed. The percentage of the diseased progeny depends on the intensity and type of disease in the mother plants. Seed from healthy stock gives up to 100% germination, whereas that from plants seriously affected by infectious sterility or leaf curl may give under 10%. The majority of viruses appear at early stages of seedling growth and the symptoms may differ from those of the mother plants. Albinism is not a virus disease, though its incidence may be increased by virus infection of the mother plant. Symptoms observed on seedlings suggest that virus complexes from mother plants, during their passage through the seed, are split into their individual components. Virus symptoms in the seedlings appear to change with the development of the plants. Heavily infected seedlings usually die. Both, young and old plants infected with leaf curl, but not those infected with spotted mosaic or infectious sterility, are resistant to downy mildew, *Peronoplasmopara humuli*. Viruses transmitted by 2-year-old seed did not lose their virulence. It is stated that virus can also be transmitted by pollen.

776. CHATER, G. P.
Hop picking by machine.
Annu. Booklet Ass. Grs New Var. Hops 1954, 1954, pp. 10-16.

Topics discussed are the Bruff stationary machine, advantages of a mobile picker, considerations governing the siting and operation of a stationary machine, production, labour requirements, adjusting the machine to suit the condition of the hops, handling the hops, suitable varieties, and changes in cultural practices to suit machine picking. [See also *H.A.*, 24: 4047.]

777. WATSON, G. A.
The drying of whole and dissected hops.
J. Inst. Brew., 1954, **60**: 400-5.

Whole and dissected hops have been dried under controlled conditions and their rates of loss of moisture followed. It is shown that the bracts* dry much more rapidly than do the strigs, both when dried on the whole hop and when the two components are dissected out and dried separately. With separated strigs and bracts there are no varietal differences in the time of drying, but such differences can arise when drying whole hops, and seem to be principally due to the number and varying compactness of the bracts around the strig. Measurements of moisture contents during the "cooling" period show that whole hops and the various components reach equilibrium moisture levels at approximately 12·5% moisture content. Under-dried hops will reach this equilibrium only very slowly, whilst correctly-dried and slightly over-dried hops reach the equilibrium within three hours. [Author's summary.]

778. HALL, R. D.
Sulphur in hop curing: influence on hop bittering power.
J. Inst. Brew., 1954, **60**: 405-9, bibl. 6.

Three levels of sulphur treatment were compared on hops of the varieties Early Bird, Fuggles, and Petham Golding, viz. (*a*) none, (*b*) normal, and (*c*) twice normal. Hops cured without S received a lower market valuation than hops given normal S treatment and produced a more bitter beer.

Insecticidal plants.

(*See also* 801r.)

779. BHATTA, K. L.
Insecticides of vegetable origin: a short note.
Mysore agric. Calendar, 1954, 1954, pp. 106-9.

Both pyrethrum and *Derris elliptica* have been introduced into Mysore and the quality of the crops grown is quite good. Several local fish poisons were examined for their insecticidal properties. The seeds of *Ponganía glabra* were found to be toxic to sucking insects. An alcohol extract of the bark of *Mundulea suberosa* was effective against caterpillars on vegetables, and certain soft-bodied sucking insects including mango leafhopper. Seeds of *Tephrosia candida* were found to contain traces of rotenone, and an extract showed a high degree of insecticidal activity against caterpillars, mealy bugs and other soft-bodied insects.

---

* Defined here as the true bracts and also the bracteoles, with or without seed.

780. Vasina, A. N., and Demidova, A. D.
The use of preparations from delphinium. [Russian.]
Sad i Ogorod, 1954, No. 8, p. 76.

Dusts and sprays prepared from delphinium, particularly its roots and seed, are toxic to many insects including cabbage white butterfly, apple sucker, various moths, aphids, and sawflies.

781. Chopra, I. C., Handa, K. L., and Prabhakar, V.
Preparation of concentrated pyrethrum extract.
J. sci. industr. Res., India, 1954, **13A**: 326-7, bibl. 3.

Solvent oil, a petroleum fraction, extracted 92–95% of pyrethrins from powdered pyrethrum flowers in 3 percolations. From these percolates concentrated extracts containing 10–12% of pyrethrins were prepared.

Rubber plants.

(*See also* 801e.)

782. Ramos, J. L.
El cultivo del guayule en España. **(Guayule growing in Spain.)** [German summary, ½ p.]
Maveg., 1954, **1**: 363-8.

In Spain experimental plantings of guayule began in 1942. The promising results so far obtained are discussed.

783. Kith Tassara, M.
Les expériences de culture de plantes à caoutchouc en Espagne. **(Experiments on growing rubber plants in Spain.)**
Ion, November, 1953, p. 632, reprinted in *Rev. gén. Caoutch.*, 1954, **31**: 621-3, illus.

Guayule is under trial in Granada, Seville, Almeria, and in Huelva in the Guadalquivir plain and on the sandy soils of the south-east. In Huelva growth is good in low-lying sites thanks to shelter and better soil but is poor when the plants are exposed to wind-blown sand; negative results were given by all mineral fertilizers except lime; green manure trials are in progress. Average yields are 9–10% for 4-year-old plants, and 6% for those of 2–3 years old. The method of extraction and the character of the rubber obtained are discussed.

Seed oils.

(*See also* 801b, w, 989, 1146.)

784. de Araujo, A. A., and Mano, E. B.
Estudio sôbre a possibilidade de aproveitamento da casca de babaçu na indústria de matérias plásticas. **(An investigation on the possibilities of using babaçu shell in the plastics industry.)**
Bol. INT, 1952, **3** (6): 28-41, bibl. 19, illus [received 1954].

Some 450,000 tons of babacu shell (*Orbygnia* spp., *Attalea speciosa*) are available annually as a by-product of the oil extraction industry. Experiments on a laboratory and semi-industrial scale show that synthetic resins suitable for use in the manufacture of plastics could be produced from babaçu shell.

785. Coomes, T. J., Islip, H. T., and Matthews, W. S. A.
Muhuhu oil and muhugwe wood (*Brachylaena hutchinsii*) from Tanganyika.
Colon. Plant Anim. Prod., 1954, **4**: 137-44, bibl. 1.

The results are reported of tests on 3 samples of muhuhu oil taken at intervals during a 48-hour distillation period and of 3 trials to determine what procedure for distilling the wood, as sawdust, would give the maximum yield of high-quality oil.

786. Sauger, L., and Tardieu, M.
La collection des ricins de Bambey. **(The Bambey castor collection.)**
Bull. agron. Minist. France d'Outre Mer, **11**, 1954, pp. 101-10, bibl. 8, illus.

An account is given of variety character studies on the castor bean collection at the Bambey Agronomic Research Centre aimed at the possible introduction into peasant agriculture of varieties which can be harvested and processed in February/May, a slack period in the farming season.

787. Raymond, W. D., Squires, J. A., and Ward, J. B.
***Dryobalanops oblongifolia* kernels and *Elateriospermum tapos* kernels from Malaya.**
Colon. Plant Anim. Prod., 1954, **4**: 159-61, bibl. 5.

The characteristics of the fat of *D. oblongifolia* appear to resemble those of illipé fat (*Shorea* spp.), but unless the former possesses outstanding agricultural attributes it is unlikely to compete with *Shorea* spp., because the kernels only contain about 30% fat and the meal residue contains too little protein to be of value as a cattle food. The kernels of *E. tapos*, which are popular as sweetmeats when roasted or fried, contain a semi-drying oil of no special merit, although the de-oiled meal, containing 22·5% crude protein, might have possibilities as a cattle food.

788. Calderwood, R. C., and Gunstone, F. D.
Vegetable oils. III—*Mallotus philippinensis* Muell. Arg. seed oil.
J. Sci. Food Agric., 1954, **5**: 382-7, bibl. 20.

M. philippinensis, the kamala or monkey face tree, is widespread throughout tropical India. The component acids of its seed oil are here reported. The data suggest that, unless the sample examined was exceptional in its low unsaturation, kamala oil is unlikely to prove useful as a drying oil, unless blended with other drying oils or treated to give an improved drying oil.

789. Hatt, H. H., and Szumer, A. Z.
The seed fat of *Omphalea queenslandiae*.
J. Sci. Food Agric., 1954, **5**: 534-6, bibl. 7.

The large seeds of *Omphalea queenslandiae*, a member of the Euphorbiaceae, contain 28% of an edible, semi-drying oil. Its component glycerides consist almost entirely of those of the four common fatty acids, which in one sample were present in the proportions: palmitic 12·7, stearic 8·1, oleic 47·0 and linoleic 31·7%. The composition of the oil is variable. [Authors' abstract] —C.S.I.R.O., Melbourne.

790. Dölle, H.
Über antibiotische Wirkungen von Actinomyceten des Bodens auf *Helminthosporium papaveris* Saw. (The antibiotic action of soil actinomycetes upon *Helminthosporium papaveris*.)
Zbl. Bakt., 1954, **108**: 127-33, bibl. 7, illus.

Out of 86 strains of actinomycetes isolated from soil in an oil-poppy field, 34 were found to be highly active, when cultured, against *Helminthosporium papaveris*.

791. Bray, G. T.
Conophor oil.
Paint Manuf., reprinted in *World Crops*, 1954, **6**: 461-2, bibl. 7, illus.

Conophor oil is obtained from the seed of the woody vine *Tetracarpidium conophorum*, a native of tropical West Africa. The kernels contain from 44 to 60% oil which has been shown to be a suitable substitute for linseed oil. Experiments were started in Nigeria in 1947 to determine the possibility of cultivating the vine commercially. It is recommended that planting should be done as soon as fresh seed is available in June so that the plants become well established before the beginning of the dry season. Germinated seed seemed preferable to seed planted *in situ*. Vegetative propagation was not successful. Although originally heavy shade was considered necessary, later trials indicated that this may not be the case. Planting at stake proved much more successful than transplanting from the nursery. The best means of supporting the vines has not yet been determined. The vines will take 4–5 years to come into substantial bearing and thereafter the yield will increase steadily for several years. The economic possibilities of production are not yet known.

Tannin plants.

(*See also* 801p.)

792. Sykes, R. L., and Simon, T. D.
Vegetable tannins in East Africa.
E. Afr. agric. J., 1954, **20**: 59-65, bibl. 14.

Indigenous and exotic trees in East Africa which are exploited for tannin or have distinct commercial possibilities as tannin producers are *Acacia mollissima*, *A. seyal*, *Eucalyptus sideroxylon*, *Pinus patula*, *P. radiata* and *Caesalpinia coriaria*. Tannin contents are given for the bark, fruit, seed or kino (an exudate characteristic of many *Eucalyptus* spp.) of East African specimens of 21 species, chiefly *Eucalyptus* and *Acacia*.

793. Hellinga, G.
Problems in maintaining soil fertility in forest plantations with a short rotation.
Indon. J. nat. Sci., 1954, **110**: 59-63.

Some problems arising from the establishment of wattle (*Acacia decurrens*) plantations in Java are discussed. To supply the need for tannin, wattle was first extensively planted at high altitudes in western Java. Abundant growth of *Eupatorium pallescens* and heavy gum flow, due to attack by woodborers, seriously damaged the plantations. Moreover, yields of second and third generation wattle grown on the same site were considerably lower than those of the first generation. This appeared to be due to establishment by the "taungya" method, i.e. interplanting with agricultural crops, and to the short rotation, i.e. 6–8 years, since soil fertility was rapidly depleted and erosion occurred. Wattle cultivation was therefore later transferred to eastern Java where rainfall is lower. Even there *Eupatorium* growth was heavy and the soil required protection. Complete removal of the weed, natural regeneration of the plantations instead of establishment by the "taungya" method, plant improvement through selection and breeding, and very careful plantation management are urged.

794. Williams, W.
The Natal wattle industry.
World Crops, 1954, **6**: 417-19, bibl. 7, illus.

The culture of black wattle, *Acacia mollissima*, is outlined and the value and tonnage of bark and bark extract exports over a number of years are given.

Sundry plants.

(*See also* 801a, g, h, t.)

795. Hirst, E. L., and Perlin, A. S.
The gum of *Acacia pycnantha*.
J. chem. Soc. Lond., 1954, pp. 2622-7, bibl. several in text.

The gum exuded by *Acacia pycnantha* has been compared with other types of *Acacia* gum. Evidence has been obtained that the molecular structure is complex and probably highly branched and it appears that gums from various species of *Acacia* must differ markedly in structural details.

796. Nambiar, M. C.
A note on the floral biology of palmyra palm (*Borassus flabellifer*).
Indian Coconut J., 1954, **7**: 61-70, bibl. 2, illus.

On the west coast of India the flowering season generally lasts from about August to January. The duration of the male phase, i.e., the interval between the opening of the first flower in an inflorescence and the shedding of the last flower ranges from 70 to 90 days. The female phase, i.e., the interval between the commencement of the receptive stage of the first flower in the spadix and the completion of the receptive stage of the last flower varies from 20 to 30 days. Among the female flowers produced, a large proportion is shed within a period of about six weeks after stigmatic receptivity. Shedding is greatest in inflorescences opening in December and January, perhaps due to seasonal causes.

797. Markley, K. S.
Caranday—a hard palm wax.
Foreign Agric., 1954, **18**: 137-8.

The caranday palm, *Copernicia australis*, is abundant in the Paraguayan Chaco and adjoining areas of Bolivia and Brazil. Its leaves yield a hard wax very similar to carnauba. A pilot plant for recovering the wax was built in 1949, but progress made in developing the industry since then has been slight. Methods of harvesting and extracting the wax are outlined.

798. Anon.
Carnauba wax.
World Crops, 1954, **6**: 463-4, illus.

An account is given of the uses of carnauba wax, obtained from the leaves of the palm *Copernicia cerifera*, methods of harvesting, costs of production and export prospects.

799. Kapur, A. P.
Lac cultivation.
Indian Fmg, 1954, **4** (5): 25-32, illus.

Information is given on the chief centres of the lac industry in India, annual production, host plants of the lac bug (notably *Butea monosperma*, *Zizyphus jujuba*, and *Schleichera trijuga*), biology of the lac bug, pruning host trees, inoculation of host plants with lac bugs, pests of the lac bug, and preparation of the lac.

800. Chittenden, A. E., and Pickering, G. B.
Seaweed from Zanzibar.
Colon. Plant Anim. Prod., 1954, **4**: 151-2.

Tests indicated that a seaweed identified as *Eucheuma cottonii* is capable of producing a good jelly and should, if properly prepared, serve as a substitute for Irish moss (*Chondrus crispus*). A second seaweed, *E. serra*, appears to be of little value for any purposes requiring gelling properties.

Noted.

801.

a Anon.
Bamboo . . . grass of many uses.
Agric. Res., 1954, **3** (2): 12-13, illus.
Possibilities for development in the southern U.S.A.

b Bachstez, M., Bustamente E., R. J., and Ripoll Gomez, P. A.
Beiträge zur Kenntnis mexikanischer Drogen, Pflanzen und Nahrungsmittel. XV. Öl aus den Samen von *Trichilia specos* (Napahuitl). XIV. Öl aus den Samen von *Jatropha cinerea* (Lomboi). **(Contributions to the knowledge of Mexican drugs, plants and foods. XV. The seed oil of *Trichilia specos*. XIV. The seed oil of *Jatropha cinerea*.)**
Maveg., 1954, **1**: 373-7, bibl. 3, illus.

c Butcher, R. W.
Colchicum autumnale **L.**
J. Ecol., 1854, **42**: 249-57, bibl. 15, map.
Distribution and biology in Britain.

d Byron, M. H., and others.
Symposium: mechanical and chemical engineering phases of fiber crop harvesting and processing in South Florida.
Proc. Soil Sci. Soc. Fla, 1951, 1951, **11**: 147-74, [received 1954].

e Cejp, K.
Možnosti využitkování některých našich plevelů. **(The possibility of utilizing certain weeds as rubber plants in Czechoslovakia.)**
Čsl. bot. Listy, 1951, **4**: 44-7 [received 1954].

f Coomes, T. J., Islip, H. T., and Matthews, W. S. A.
Oil of *Pentzia schistostephioides* from Southern Rhodesia.
Colon. Plant Anim. Prod., 1954, **4**: 145-50.
A leaf oil not worth exploiting.

g Dhar, A. N.
Cation exchange resin from myrobalan nuts.
J. sci. industr. Res., India, 1954, **13A**: 392.
[*Terminalia* spp. ?]

h Fowden, L., and Done, J.
The isolation of tyramine from a West African *Crinum* species.
J. exp. Bot., 1954, **5**: 305-12, bibl. 18, illus.
From *C. yuccaeflorum*.

i Guthrie, W. R., and others.
Symposium: agronomic phases of fiber crop production in South Florida.
Proc. Soil Sci. Soc. Fla, 1951, 1951, **11**: 120-46, illus. [received 1954].
Ramie, kenaf and sansevieria.

j Horner, C. E.
Factors affecting the disease cycle of peppermint rust.
From abstr. in *Phytopathology*, 1954, **44**: 493.
Temperature and humidity during over-wintering.

k Howard, G. A., and Tatchell, A. R.
The chemistry of hop constituents. Part VI. The structure of cohumulone.
J. chem. Soc. Lond., 1954, pp. 2400-5, bibl. several in text.

l Klohs, M. W., and others.
Alkaloids of *Rauwolfia serpentina* Benth. IV. Reserpiline.
Chem. Ind. Lond., 1954, No. 41, pp. 1264-5, bibl. 3.

m Muszynski, J.
Über die Arzneipflanzenproduktion Polens. **(The production of medicinal plants in Poland.)** [French summary 13 lines.]
Maveg., 1954, **1**: 378-81.

n Rangaswami, S., and Rao, E. V.
Isolation of lycorine from *Crinum defixum* Ker-Gawl.
Curr. Sci., 1954, **23**: 265-6, bibl. 5.

o Regel, C.
Neuere Forschungen über pflanzliche Rohstoffe in Australien. **(Recent studies on plant raw materials in Australia.)** [English summary ¾ p.]
Maveg., 1954, **1**: 384-90.
Includes essential oils, drug plants and agar production.

p Rungs, C.
La chenille arpenteuse de l'acacia à tanin. **(The looper caterpillar of *Acacia mollissima*.)**
Trav. orig. Serv. Déf. Végétaux, **5**, 1954, pp. 55, bibl. 13, illus.
Tephrina spp.

q Salgues, R.
Études sur les Pittosporacées. I. Les huiles essentielles de *Pittosporum*. **(Studies on the Pittosporaceae. I. The essential oils of *Pittosporum*.)**
Maveg., 1954, **1**: 340-58, bibl. 63.

r Snyder, H. R., and others.
The insecticidal principles of *Haplophyton cimicidum*. II. Haplophytine and cimicidine.
J. Amer. chem. Soc., 1954, 76: 4601-5, bibl. 8.

s Subbaratnam, A. V.
Chemical examination of the bark of *Tabernaemontana dichotoma* Roxb.
Curr. Sci., 1954, **23**: 66, bibl. 3.
For alkaloids.

t Vanaspati Research Advisory Committee.
Literature review on fats and oils 1952.
J. sci. industr. Res., India, 1954, Vol. **13**, No. 8, Suppl., pp. 27, bibl. extensive in text.
A review covering many aspects of production and utilization.

u Watson, T. R., and Wright, S. E.
The cardiac glycosides of *Gomphocarpus fruticosus* (R. Br.).
Chem. Ind. Lond., 1954, No. 38, p. 1178, bibl. 6.
From plants growing exotically in Queensland.

v Wenkert, E., and Hansen, J. H.
The *Amaryllidaceae* alkaloids.
Chem. Ind. Lond., 1954, No. 41, pp. 1262-3, bibl. 14.

w (Zimmerman, L. H., and Parkey, W.)
3-way is the easy way with castorbean hybrids.
Agric. Res., 1954, **3** (2): 11.
Male sterility in castor bean hybrids and its value in breeding.

FLORICULTURE.

General.

(*See also* 3, 4, 54, 65, 86-89, 96-99, 103b, z, 274, 279, 360, 363, 394, 884h, k, l, r, t, v, y, 942, 985q, 1135, 1139, 1148.)

802. Cattell, M. D., and others.
Garden structures.
Brooklyn bot. Gdn Rec., 1954, **10**: 81-154, illus., obtainable as a separate, $1.

The whole of this number of the journal is devoted to articles on such aspects of garden design as paved terraces, walks and paths, types of steps and their construction, walls and fences, garden pools, arbors and shelters, tool and potting sheds and garden seats. The text is supported by numerous diagrams and photographs.

803. Deering, R. B., and Brooks, F. A.
The effect of plant material upon the microclimate of house and garden.
Nat. hort. Mag., 1954, **33**: 162-7, bibl. 1, illus.

The authors discuss, with the aid of diagrams, the planning of houses and gardens with particular reference to the ways in which vegetation can be used to modify temperature extremes. Among the factors considered are the micro-climatic effects of lawns, shrubs and shade trees, the orientation of houses and methods of keeping the sun off roofs, walls, windows and paved surfaces.

804. Boskoop.
Jaarboek uitgegeven door het proefstation voor de Boomkwekerij te Boskoop 1953.*
(Yearbook of the Boskoop Tree and Shrub Nursery Experimental Station, 1953), [1954], pp. 111, illus.

Experiments are concerned mainly with ornamental trees and shrubs, and reports on several are abstracted separately below. Other work described concerns rose diseases, forcing forsythias and azaleas, rootstocks for *Prunus*, and the breeding and selection of ornamentals.

805. Werckmeister, P.
Papierchromatographische Untersuchungen an Anthozyanen und chymochromen Begleitstoffen zur Frage der Blütenfarbenzüchtung. **(Paper chromatographic studies of anthocyanins and other coloured materials from the sap, in relation to breeding for flower colour.)**
Züchter, 1954, **24**: 224-42, bibl. 32.

The flower pigments of cineraria, delphinium, violet, iris and cyclamen were studied by paper chromatography and defined with the aid of the *Horticultural Colour Chart*. The findings are discussed in relation to flower breeding.—Geisenheim/Rhein.

806. Mahlstede, J. P., and Kirk, L. K.
Polyethylene: a solution to nursery shipping problems.
Amer. Nurserym., 1954, **100** (4): 7-8, 57-64, illus.

The effect of polyethylene packing materials on spring shipments of carnation, delphinium, strawberry and rose plants was studied at Iowa State College. The plants were packed, shipped 1,200 miles, then weighed, set out under irrigation and plant survival was noted. In all cases the moisture loss per pack was considerably reduced in polyethylene packs, but the loss was not correlated to plant survival. Carnation, delphinium and strawberry plants showed a drop in their survival rate in late spring shipments. For carnations sealed polyethylene bags gave consistently good results. The most satisfactory packages for delphiniums were open polyethylene bags which were enclosed in 60-pound kraft paper, but with the tops left open. Sealed polyethylene bags wrapped in kraft paper gave good results with strawberry plants which had started sprouting. Rose bushes were best shipped in kraft paper with a polyethylene coat. All polyethylene packs showed a reduction in postage and material costs when compared with commercial packs.

807. Wells, J. S.
Container plant culture.
Amer. Nurserym., 1954, **100** (3): 19, 72-6, illus.

* Formerly *Jaarboek uitgegeven door de Vereniging "De Proeftuin" te Boskoop.*

For growing ornamental nursery stock in cans the use of standard John Innes potting compost, possibly with the addition of some coarse grit or stone, is recommended. Regular watering, the frequency and amount of which is determined by a simple measurement and experience, should be applied. Among methods of winter protection for both evergreen and deciduous plants plunging the cans in a medium such as ground corncobs, sawdust, peat or wood chips and the provision of overhead lath shade or side protection was found most suitable. For the nutrition of plants grown in the John Innes compost a light dressing with organic N during the second year appears adequate.

808. Lunt, O. R., and Sciaroni, R. H.
Synthetic fertilizer tested.
Calif. Agric., 1954, **8** (9): 11, illus.

A new synthetic fertilizer uramite, combining urea and formaldehyde, has a low solubility and releases N over a long period of time. It is estimated that 3 dressings per year will provide a good N supply in greenhouse soil. Top-dressings applied to azaleas, carnations, roses, snapdragons, poinsettias, Croft lilies, chrysanthemums, cyclamens and hydrangeas gave promising results; no injury was apparent.

809. Young, R. A.
Dissemination of plant pathogens on nursery and ornamental plants.
Plant Dis. Reptr, 1954, **38**: 417-20, bibl. 14.

The spread of the following pathogens is usefully discussed: Camellia flower blight (*Sclerotinia camelliae*), cypress root rot (*Phytophthora cinnamomi*), gladiolus diseases, crown gall (*Agrobacterium tumefaciens*), root lesion nematodes (*Pratylenchus* spp.).—Dep. Plant Path., Corvallis, Ore.

810. Schread, J. C.
Control of insect pests of ornamentals.
J. econ. Ent., 1954, **47**: 498-500, bibl. 2.

Results are presented of tests with several of the newer insecticides against oystershell scale, *Lepidosaphes ulmi*, pine needle scale, *Phenacaspis pinifoliae*, azalea bark scale, *Eriococcus azaleae*, birch leaf miner, *Fenusa pusilla*, boxwood leaf miner, *Monarthropalpus buxi*, apple aphid, *Aphis pomi*, and 4-spotted hawthorn aphid, *Amphorophora crataegi*.

811. Lindley, C. D.
Tests with systemic insecticides.
Grower, 1954, **42**: 629-30.

Preliminary results are given of experiments in which systox was used against aphids and red spiders on flower crops. Good control of aphids on pot chrysanthemums, and of both pests on first-year carnations and some ornamental pot plants was obtained by using 2 oz. systox/100 gals. On hydrangeas good control of both pests was given by a spray of 4 oz./100 gals., and on second- and third-year carnations and roses by 6 oz./100 gals.

812. Odom, R. E.
Onderzoek over de houdbaarheid van snijbloemen. (**Experiments on the keeping of cut flowers.**) [English summary $\frac{3}{4}$ p.]
Meded. Dir. Tuinb., 1954, **17**: 830-6, bibl. 4, illus.

A series of trials was made to evaluate the use of several chemicals in water to prolong the life of cut flowers. Good results were obtained with a solution containing 0·009% SO_2, 0·0005% phosphoric acid, 0·0002% orthoboric acid, 0·0005% "superol", and 4% sucrose. This solution (formula A) increased the life of carnations, lilac, chrysanthemums, roses and dahlias. It appeared that the treatment of carnations for several days in formula A, increased their subsequent life in water. At high light intensities carnation flowers did not last so long as at lower light intensities, the temperatures in both cases being the same.

Annual and herbaceous plants.

(*See also* 397, 884j, p, 1144, 1179.)

813. Samantarai, B., and Sinha, S. K.
Rooting response in three shades of leaves of *Amaranthus gangeticus* L.
Sci. and Cult., 1954, **20**: 187-9, bibl. 2.

Isolated leaves were treated with indolebutyric acid. Green leaves showed the best rooting and pinkish leaves the worst, while leaves of an intermediate colour gave an intermediate response.

814. Ozawa, H., and Kikugawa, I.
Investigations on the rooting of herbaceous cuttings of carnation in various soil media.
[Japanese, with English summary $\frac{1}{4}$ p.]
Bull. hort. Sect. Kanagawa agric. Exp. Stat., 1953, No. 1, pp. 35-9, bibl. 8.

Cuttings of Coral carnation rooted better in sand plus vermiculite than in sand alone, vermiculite alone or various sand-soil mixtures. The best physical conditions for rooting were 19–35% soil moisture, 60% porosity and 30–40% air content.

815. Scognamiglio, A.
Esperimenti di lotta contro l'*Heterodera marioni* (Cornu) Goodey. (**Experiments on the control of *Heterodera marioni*.**) [English summary $\frac{1}{2}$ p.]
Ann. Fac. Agrar. Portici, 1951-53 (issued July 1954), **20**: 140-50, illus.

A month before planting carnations D-D was injected at a spacing of 33 × 33 cm. and at depths of 10 or 15 cm. in a greenhouse soil heavily infested with *Heterodera marioni*, some of the plots being subsequently watered and some rolled to prevent the escape of the fumigant. Nine months later the infestation rates for the 15 cm. irrigated, 15 cm. rolled, 10 cm. irrigated, 10 cm. rolled, and control plots were 10, 20, 35, 35 and 100% respectively. The average height of the treated plants was 67 cm. compared with 27 in the controls.

816. Ministry of Agriculture, London.
Chrysanthemums.
Bull. Minist. Agric. Lond. **92**, revised 1954, pp. 55, illus.

The principal revisions in this 4th edition are the recasting of the chapter on the chrysanthemum plant, the addition of a section on regulation of flowering by day-length control, and a new chapter on cultivation from late-struck cuttings. [For an account of the 3rd edition see *H.A.*, 22: 4138.]

817. STAHN, B.
Das grossblumige Chrysanthemum-Sortiment in seiner Entwicklung bis zur Gegenwart. **(The history of breeding large-flowered chrysanthemum varieties.)**
Dtsch. Gartenb., 1954, **1**: 322-6, bibl. 6, illus.

A survey is given of developments in chrysanthemum breeding since 1789, when a French merchant brought 3 sorts of *Chrysanthemum indicum* to Europe from China.

818. SCHWABE, W. W.
Factors controlling flowering in the chrysanthemum. IV. The site of vernalization and translocation of the stimulus.
J. exp. Bot., 1954, **5**: 389-400, bibl. 19.

A series of experiments was carried out on the vernalization of chrysanthemum plants, variety Sunbeam, which were kept at a day-length of 8 hours. Vernalization of the apices alone was sufficient to cause greatly accelerated flowering, whereas chilling of other plant parts did not affect flowering. Experiments involving grafts between vernalized and unvernalized plants, with or without defoliation, showed no evidence of translocation of the stimulus through mature tissues. One or more successive decapitations of fully vernalized plants showed that the stimulus was passed on to lateral apices arising after the cold treatment of the original meristems had ended.—Imperial College, London.

819. VINCE, D., AND MASON, D. T.
Acceleration of flowering in non-vernalized chrysanthemums by the removal of apical sections of the stem.
Nature, 1954, **174**: 842-3, bibl. 2, illus.

It has been shown that under certain conditions the chrysanthemum variety Sunbeam (sometimes incorrecly called Indian Summer) requires a period of low temperature for normal stem elongation and early flowering to occur. However, when an apical section of the stem of non-vernalized plants was removed the lateral shoots induced did not exhibit the rosette habit and flowered rapidly under short-day, high temperature (> 60° F.) conditions. These findings suggest that some inhibiting substance is produced by the apex of the main axis which is not produced, or produced to a lesser degree, by the apices of the lateral shoots which develop when apical dominance is removed. The variety President gave no response to decapitation under short-day conditions, but with a sufficient number of long-day cycles given after decapitation the inhibition of the apex was not completely re-imposed and the lateral shoots were able to elongate and flower under short-day conditions.—Univ. Reading.

820. FURUTA, T.
Photoperiod and flowering of *Chrysanthemum morifolium.*
Proc. Amer. Soc. hort. Sci., 1954, **63**: 457-61, bibl. 6.

Plants of four varieties of chrysanthemums were grown in photoperiods of 12, 13, 14, 15 and 16 hours to determine their influence on flower bud initiation and development. Briefly stated, the results were as follows: (1) Photoperiods over 14 hours duration did not cause flower bud initiation. Flower buds initiated in photoperiods over 14 hours duration but this was correlated with growth. Photoperiods under 14 hours duration caused flower bud initiation. (2) A shorter photoperiod was needed for maximum rapidity of flowering than was needed for flower bud initiation. Flower bud development was delayed by photoperiods of 13 hours or over. (3) Varietal differences were noted. The later a variety flowers (longer response group), the shorter the photoperiod necessary for both initiation of flower buds and maximum rapidity in flower bud development. (4) At photoperiods near the maximum limit, full open flowers and small flower buds were present on the same stem. This condition was not true under shorter photoperiods. [Author's summary.]—Agric. Exp. Stat., Auburn, Ala.

821. CAROLIN, R. C.
Stomatal size, density and morphology in the genus *Dianthus.*
Kew Bull., 1954, No. 2, pp. 251-8, bibl. 9, illus.

Stomatal density and size were measured in a number of species of *Dianthus*. It was established that density could not be used to indicate ploidy. It was established that size could not be used to indicate ploidy as many diploid species had larger stomata than hexaploid species. Providing the chromosome number of a race of a species is known, the method may be useful in indicating the ploidy of other races within that species. Stomatal size is of use in determining the relationships of some diploid species and may be useful with recent polyploid species. Stomatal size and density on abaxial leaf surface are uncorrelated over species. The ratio stomata on adaxial: stomata on abaxial leaf surface is correlated with leaf type and is characteristic of the group within limits. Observations on stomatal type led to the description of six types which proved fairly uniform in the diploid groups and will probably be useful in working out the affinities of polyploid species. [Author's summary.]

822. REED, S. C.
African violet genetics.
J. Hered., 1954, **45**: 225-30, illus.

Ten mutations of the African violet, *Saintpaulia*, are described. The behaviour and modes of inheritance of 5 dominant and 5 recessive genes have been clarified as a result of crossing and selfing experiments. The dominant genes are those producing a white spot at the base of the leaf, double flowers, complete flower pigment inhibition, a dilute red flower colour, and mottled flower pigment inhibition. The recessive genes are those causing red flower colour, leaf curling, white edging to flower colour, true pink colour, and a flower colour of lavender flecked with purple.

823. CAHOON, G. A., AND CRUMMETT, D. O.
Mineral nutrition of stocks.
Calif. Agric., 1954, **8** (9): 10, 15, illus.

Studies on the K content of stocks (*Matthiola incana*) have shown that in K-deficient plants the content varied from 0·67% to 1·59% of the dry weight, whereas normal plants contained 3% to 6% K in the lower leaves. K absorption and utilization was compared in 16 commercial stock varieties, but no differences of importance were found. Increased K caused greater dry weight, stem diameter, nitrate and K content. K deficiency symptoms became visible on the leaves when their K content was 1·2% to 1·5% and in the absence of Na and ammonium ions. Sodium had a beneficial effect on plants with low K, but could not act as a substitute. Soil analyses demonstrated that a high Ca/K ratio was associated with low plant K, and *vice versa*.

Bulbs, tubers, etc.

(*See also* 382, 556, 884a, o, w, 1134.)

824. Hewitt, E. J., and Miles, P.
The effects of deficiencies and excesses of some mineral nutrients on the growth of tulip and daffodil bulbs in sand culture.
J. hort. Sci., 1954, **29**: 237-44, bibl. 10, illus.

Rose Copland tulips and King Alfred daffodils were grown in sand cultures with a complete nutrient, extra N, deficiencies of N, P, K, Ca, Mg, and excess Mn. The deficiency effects were greater in tulip than daffodil. Visual symptoms and bulb weight data show that tulips were most sensitive to deficiencies of N, Mg and Ca in their first year, P deficiency being more marked in the second year and K in the third. Ca deficiency in tulips caused collapse of the stalk above the top leaf at flowering in the first year and total physiological breakdown of the bulb by the end of the second year; the "topple" effect was also caused by K deficiency in the third year. In daffodils Ca deficiency caused bulb breakdown in the second year. Bulb weight of daffodils increased least in those grown without N or Ca in the first year, without P in the second year, with K deficiency becoming apparent in the third year.

825. Stuart, N. W.
Bud formation and development, storage and forcing of bulbous crops.
Flor. Exch., 1954, **123** (12): 18-19, 24.

The two groups of bulbs, those which do not initiate flowers until after growth starts such as iris, gladiolus and lily, and those in which flower development continues during the apparent dormant period such as tulip, narcissus and hyacinth, are discussed separately. Procedures for forcing different types of iris and lily are summarized. Methods of storing and forcing tulip, narcissus and hyacinth, based partially on Dutch findings are suggested. [Much of the summarized information provided has been reported in detail and abstracted earlier.]

826. Gould, C. J., Breakey, E. P., and Courtney, W. D.
Bulb treatment recommendations for spring, 1954.
Bulb treatment recommendations for fall, 1954.
Stat. Circs west. Wash. Exp. Stat. **241** and **224**, 1954, both pp. 4.

Recommended control measures are tabulated for various diseases and pests of gladiolus, iris, lily, narcissus and tulip bulbs in western Washington.

827. Gould, C. J., and McLean, D.
Soil treatment for the control of fungi.
Proc. Bulb Grs' short Course 1954, Tacoma, Wash., pp. 24-6.

Pentachloronitrobenzene applied to the soil at 200 lb. active material per acre gave promising results against the bulb diseases, crown rot, caused by *Sclerotium delphinii*, and black rot, caused by an unidentified species. DD and CBP-55 used in soil treatments gave the highest bulb yields, but also increased disease incidence.

828. Dutt, B. S. M.
Some anatomical peculiarities of the roots of *Crinum asiaticum* L. and *C. defixum* Ker.
Sci. and Cult., 1954, **20**: 183-4, bibl. 9, illus.

The peculiarities in question concern the velamen, phellogen and lenticels present in these roots.

829. Gerlach, W.
Untersuchungen über die Welkekrankheit des Alpenveilchens. **(Wilt disease of cyclamen.)**
Phytopath. Z., 1954, **22**: 125-76, bibl. 68, illus.

A study of the fungus causing wilt of cyclamen is described in detail. The disease is caused by *Fusarium oxysporum* f. *cyclaminis*, which grows between 6° and 35° C., its optimal temperature being 28° C., and its optimal pH range 6·6 to 8·5. Cyclamen plants are susceptible at all stages of growth, symptoms appearing on roots, corms and aerial plant parts. The fungus is soil-borne, but probably not seed-borne. Fungicide trials gave unsatisfactory results, the mercurials used being phytotoxic. The use of fresh soil or soil sterilized by steam or chlorpicrin greatly reduced the incidence of the disease.

830. Martin, C.
Recherches sur les maladies à virus du dahlia. **(Research on virus diseases of dahlias.)**
Ann. Épiphyt., 1954, **5**: 63-78, bibl. 9.

The main results are given of 4 years' research at Versailles on the biochemical aspect of 3 virus diseases of dahlia, namely, dahlia mosaic, cucumber mosaic and spotted wilt. The methods used for isolating dahlia mosaic and obtaining its anti-serum are given. Biochemical diagnosis of plants showed that the activity of the enzymes cytochrome-oxidase, peroxidase and tyrosinase were greater in infected than in healthy plants. A rapid method of detecting infected plants is described, based on the ability of infected sap to oxidize a 2,6-dichlorophenolindophenol solution, when a blue coloration is produced. A method of producing virus-free plants of "Rêve Rose" is now in its fourth year. Terminal buds of infected "Rêve Rose" were detached and grown on nutrient media for some weeks without producing roots, and the plantlets were then grafted on young dahlia plants grown from seed. Six varieties have so far been treated by this method.

831. van Koot, Y., and others.
Virusverschijnselen in Freesia's. **(Virus diseases in freesias.)** [English summary 9 pp.]
Tijdschr. PlZiekt., 1954, **60**: 157-92, bibl. 9, illus.

Virus diseases have spread seriously in freesias in recent years: 2 viruses have been identified by serological tests, namely Freesia-virus, which is very common, and Phaseolus-virus 2, which is less common but causes serious damage. Varieties vary in susceptibility. Giant White and Prinses Irene do not show symptoms of Freesia-virus, and Phaseolus-virus 2 is shown as light stripes on the bracts. The majority of cultivated varieties show leaf mosaic with Phaseolus-virus 2, and few symptoms with Freesia-virus; "pinching" of the flowers, which do not open, occurs only with Phaseolus-virus 2. Freesia-virus is shown clearly by Marion as leaf mosaic. Some varieties, such as Bronze Giant and King of the Yellows, show leaf spotting without serological identification of a virus. The virus is transmitted in the corms or mechanically in cutting the flower stalks, but not apparently by seed. Freesia-virus was easily transmitted by the aphid *Macrosiphum euphorbiae*, and is probably persistent. Phaseolus-virus 2 also infects gladiolus, beans and sweet peas. Electron micrographs showed that the particles of Freesia-virus were rod-shaped, and those of Phaseolus-virus 2 were coiled. The most important method of control is by selection of propagating material. Infected varieties should not be grown near healthy varieties. Aphid control may be obtained by spraying every 2 weeks with 0·1% systox.

832. TSUKAMOTO, Y.
Dormancy of gladiolus corms. I. Temperature treatment for the breaking of dormancy and the reaction of treated corms to tetrazolium. [Japanese, with English summary ⅓ p.]
J. hort. Ass. Japan, 1954, **23**: 16-20, bibl. 8.

Previous experiments on breaking dormancy in gladiolus corms showed that ethylene chloride treatment was not always necessary if the material was treated at suitable temperatures and that its effect varied with variety and with depth of dormancy and was sometimes harmful. In the experiment here described temperature treatment was studied for corms of the Radiance variety dug in summer. The most successful treatment for breaking dormancy was dry storage at 35–38° C. for 10–15 days, and then at 1° C. for 10 days. The strongest reaction to tetrazolium was shown by those corms which had received the most effective heat treatment.

833. YOUNG, R. A.
Fungicide-insecticide mixtures in pre-planting corm treatments for control of bacterial scab of gladiolus.
Plant Dis. Reptr, 1954, **38**: 55-6, bibl. 4.

Trials and observations in 1951, 1952 and 1953 indicate that a successful pre-treatment of gladiolus corms for scab control is provided by a 30-second dip-treatment in a mixture of 2 lb. of New Improved Ceresan, 2 lb. of 20% aldrin or heptachlor, and ½ pint of Triton 1956B or DuPont spreader-sticker in 100 gallons of water. In three trials the addition of aldrin and heptachlor to corm treatment mixtures resulted in significant decreases in the incidence of scab and had no deleterious effect.—Agric. Exp. Stat., Corvallis, Ore.

834. GOULD, C. J.
Botrytis diseases of gladiolus.
Plant Dis. Reptr, 1954, *Suppl.* **224**, pp. 31, bibl. 83, illus.

This is a literature review together with hitherto unpublished data of the author and others. Botrytis is ranked the second most important gladiolus disease in the U.S.A. Its development depends on cool temperatures and high humidity. It is usually caused by *Botrytis gladiolorum*, occasionally by *B. cinerea*, *B. elliptica* and perhaps *B. gladioli*. All parts are affected. Basic control methods recommended are: (1) Planting in a location with good soil and air drainage. (2) Roguing of diseased plants and removal of old flower spikes. (3) Spraying periodically with nabam, ferbam, or zineb sprays during weather favourable for the fungus. (4) Digging as early and in as dry weather as possible. (5) Heat-curing promptly at 85° to 95° F. with a relative humidity of about 80% for 7 to 10 days, cleaning and returning to the curing chamber for 4 to 7 days more. (6) Storing at 40° to 50° F. with a relative humidity of about 70 to 80%.

835. GOULD, C. J.
Report from Northwest on gladiolus dry rot.
Reprinted from *South. Flor. Nurserym.*, 19 March 1954, pp. 4, illus.

The results of experiments at the Western Washington Experiment Station offer some hope that a suitable soil treatment for control of gladiolus dry rot may be found, although none of the materials so far tested has proved to be really outstanding. In the meantime the use of new land is recommended. If new land is used, very effective control of dry rot can be obtained by the following measures: (1) careful roguing in the field; (2) digging in dry weather and as early as possible; (3) curing immediately after digging for 7–10 days at 85–95° F. with about 80% relative humidity; (4) careful culling; (5) storing in cool (40–50°) temperatures and a relative humidity of 70–80%; (6) disinfecting with thiram (1% suspension active material) before planting; and (7) planting on clean land with good drainage.

836. HAASIS, F. A.
Control of dry rot of gladiolus corms in storage with fungicides applied after harvest.
Plant Dis. Reptr, 1954, **38**: 518-20, bibl. 7.
Dry rot of gladiolus: its control in storage.
Agric. Chemls, 1954, **9** (10): 58-60.

Trials indicate that immersion of gladiolus corms shortly after corm harvesting for 5 minutes in ceresan-M at a concentration of 1 lb. to 100 gallons will effectively reduce storage loss due to *Stromatinia gladioli* without endangering future growth. Fair control was also achieved by steeping the corms for 1 hour in Dow 9B or Dowicide B. None of these compounds appeared to be phytotoxic.—Veg. Res. Lab., Castle Hayne, N.C.

837. CROPSEY, M. G., LUNDE, R. N., AND STAFFORD, D. E.
Machine harvests gladiolus corms.
Agric. Engng St. Joseph, 1954, **35**: 565-7, 573, illus.

A gladiolus corm harvester constructed at Oregon State College is described in detail. It consists essentially of a lifter frame and a trailer frame. The former lifts the gladiolus plant out of the ground, conveys it to the rear of the machine and cuts the top off flush with the top of the corm. The trailer frame supports the lifter frame and carries the operator and trays. In trials the machine has harvested, on an average, 1½ acres in a 10-hour day. Injuries to corms were generally below 1·5%. To operate satisfactorily the corms should be planted in straight rows and at a uniform depth. A tractor-mounted unit and other improvements should result from further research.

838. STUART, N. W., AND GOULD, C. J.
Forcing bulbous iris as affected by time of harvesting and post-harvest handling.
Flor. Exch., 1954, **123** (14): 18, 43, 54, 56.
Wedgewood iris forcing in 1953-54.
Proc. Bulb Grs' short Course 1954, Tacoma, Wash., pp. 29-30.

Tests are described in the first paper which show that abnormally early forcing of immature bulbs (harvested 13 July) is disastrous and that the effects cannot be prevented by the usual heat-curing and precooling procedures. When such immature bulbs were heat-cured, precooled and forced later in the season (15 October) they bloomed in early December, as did bulbs harvested 2 weeks later and given the same treatment. For maximum earliness it is desirable to use 10- to 11-cm., mature, heat-cured bulbs, precooled for at least 6 weeks, to plant in October and to increase the forcing temperature to 60° to 65° F. Delay in planting after precooling delayed blooming and increased the amount of blinding and blasting. A heat-curing period of 10 days at 90° F. accelerated blooming more than a 5-day period and was as effective as a 20-day period. A delay of more than a few days between harvesting and heat-curing reduced the effectiveness of the treatment. The so-called Dutch iris varieties, which are later than Wedgewood, appear to respond to heat-curing, should be precooled somewhat longer than Wedgewood, planted a few weeks later and possibly forced at a slightly lower night temperature.

The second paper gives a condensed account of the same work.

839. PIERCE, R. G.
Increasing Ismene lily bulbs.
Nat. hort. Mag., 1954, **33**: 210-12, illus.

Under conditions in which bulbs of the Ismene lily, *Hymenocallis calathina*, rarely doubled in number during a season, multiplication ranging from 3- to 16-fold has followed bisecting the parent bulbs vertically or injuring them in other ways.

840. STUART, N. W.
Moisture content of packing medium, temperature and duration of storage as factors in forcing lily bulbs.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 488-94, bibl. 5, illus.

New-crop, southern-grown Easter lily bulbs can be forced for blooming in November or December of the same year, thus eliminating the long storage needed when bulbs of the previous season's crop are forced. Maximum acceleration in blooming is obtained by storage of the freshly harvested, mature bulbs, packed in moist peat, for 5 to 6 weeks at a temperature of 45° to 50° F. Lily bulbs intended for winter and spring planting deteriorate, even though stored at low temperature, if packed in wet or in excessively dry peat. The bulbs have a longer storage life and produce more flowers if packed in peat containing 30% to 50% moisture in cases lined with polyethylene plastic film that are stored at 31° F. This material prevents loss of moisture from the storage case and permits the use of drier packing material with less hazard of damage from bulb rotting, rooting, sprouting, and desiccation. [Author's summary. See also *H.A.*, 24: 678 and 679.]—Plant Ind. Stat., Beltsville, Md.

841. DE BOER, S.
Bestrijding rot in leliebollen. **(Control of lily bulb rot.)**
Jaarb. Proefstat. Boomkw. Boskoop 1953, pp. 9-10, illus.

In further experiments on the control of bulb rot in *Lilium speciosum album* in 1953 soil treatment with Aafuma, contrary to earlier results [*H.A.*, 24: 680], had almost no effect, and bulb quality was similar to that of bulbs grown in untreated soil. Bulb treatment with Tripomol (TMTD), however, again resulted in the production of large, healthy bulbs with good root systems, and this control method is now recommended for practical use.

842. BIJLOO, J. D.
Enige proeven ter bestrijding van cysten van *Heterodora rostochiensis* tussen de wortels van *Convallaria*—bloeikiemen. **(Some experiments to control the cysts of *Heterodora rostochiensis* lodged between roots of lily-of-the-valley pips.)** [English summary 8 lines.]
Tijdschr. PlZiekt., 1954, **60**: 199-202, bibl. 4.

During 1951 and 1952 experiments were carried out with lily-of-the-valley pips to destroy cysts of the nematode *Heterodora rostochiensis*. Although lily-of-the-valley is not itself attacked by the nematode, pips exported to the U.S.A. must be free of cysts. In an experiment using organic mercury (Aaventa) as a dip, concentrations sufficiently strong to control the larvae seriously damaged or killed the pips. When the pips were dipped in low concentrations of 3 other nematocides, viz. mercurichloride, chloracetate and allylisothiocyanate, followed by several months of freezing, good control of cysts was shown, but the treatments again severely damaged the pips.

843. KALIN, E. W.
Flower removal in the field and its effects on bulb production and forcing quality of *Narcissus pseudonarcissus* var. King Alfred.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 473-87, bibl. 20, illus.

All forms of flower stem removal in the field reduce bulb production and quality of King Alfred narcissus bulbs. Snapping the flower head from the plant in the field during the previous growing season produces bulbs which have a greater individual weight and greater flowering potential when forced. The number and quality of blooms from forced bulbs are greater when the flower heads have been snapped from the plants in the field during the previous growing season than when the entire flower stem is removed from the plants in the field during the previous growing season. Bulb weight proved to be a good criterion of forcing quality. The detrimental effect of continued flower stem removal in the field is cumulative upon the bulbs in number and quality of flowers produced when forced. The ability and efficiency of the flower stem to act as a supplementary food manufacturing organ is clearly substantiated. The rate of dry matter accumulation in narcissus bulbs increases during the months of April, May and June, and gradually decreases as the bulbs approach maturity in July. During the active growing period, from April to August 1st, the sugar content of narcissus bulbs decreases and the starch content increases. No association between mineral and carbohydrate content and the vegetative responses which resulted from the various amounts of flower stem removal in the field could be obtained. [Author's conclusions.]—St. Coll. Wash., Pullman.

844. Doucette, C. F.
Dips for control of narcissus bulb fly.
Proc. Bulb Grs' short Course 1954, Tacoma, Wash., pp. 33-4.

A 10-minute pre-planting dip of narcissus bulbs in an insecticidal solution gave good control of bulb fly. Effective insecticides were heptachlor at 1 lb., aldrin at 2 lb., and chlordane at 4 lb. per 100 gal. water. Bulbs were planted up to 6 weeks after treatment with no loss of insecticidal efficiency. It proved practicable to combine an organic mercurial for basal rot control with the dip. Tests on the possibilities of combining an insecticide with hot water–formalin treatment have shown promise, the addition of ½ oz. of heptachlor to 100 gal. of the solution giving complete protection against fly. [See also *H.A.*, 24: 4114.]

845. Kalin, E. W.
The influence of variety and water treatments on the keeping qualities of cut daffodil flowers—progress report.
Proc. Bulb Grs' short Course 1954, Tacoma, Wash., pp. 30-1.

Flowers of King Alfred, Rembrandt, Flower Carpet and Carlton were kept at room temperature. The water was treated with Floralife at the recommended concentration (1 teaspoonful of 40% formalin per qt water). There was only slight varietal difference in keeping quality. Floralife had neither a beneficial nor a harmful effect compared with untreated controls. From the appearance of injury on the stems of treated flowers it is concluded that the concentration of formalin used was too high.

846. Bailey, P. C.
Differential reactivity in chromosomes as an indicator of species in *Trillium*.
Bot. Gaz., 1954, **115**: 241-8, bibl. 11, illus.

The pattern of differential segments produced in metaphase, root-tip chromosomes that had been subjected to cold treatment (3° C. for 96 hours) was not constant in *Trillium grandiflorum* and *T. erectum* plants collected from widely separated areas. However, certain regions of differential reactivity appear to be constant as to position, though not as to length, within a species. In *T. erectum* 14 differential segments were constant as to position, whereas 18 such segments appear to be constant in *T. grandiflorum*, and it is probable that this difference can be used to separate the two species.

847. Kraayenga, D. A.
Groeimetingen bij de tulpebol. **(Growth measurements of the tulip bulb.)** [English summary 11 lines.]
Meded. Dir. Tuinb., 1954, **17**: 825-9, illus.

In a study on the relation between weather conditions and bulb yields, a pilot experiment was set up to measure the seasonal growth of a tulip bulb, variety Krelage's Triumph. A copper band was placed round the bulb, and the increase in bulb circumference recorded on a revolving drum. The growth lines recorded showed that growth took place at night, particularly after midnight. Growth was most rapid during the 4 or 5 days after the flower heads had been removed.

848. Toyoda, T., and Nishii, K.
Studies on flower forcing of tulips for export. (1) Effects of low temperature treatments on flower forcing. [Japanese, with English summary ⅓ p.]
J. hort. Ass. Japan, 1954, **23**: 21-30, bibl. 6, illus.

The most effective low-temperature treatment for forcing tulips destined to undergo the 4–6 weeks' voyage to the U.S.A. was an 8-week treatment consisting of 2–3 weeks at 4° C., 3–5 weeks at 2° C. and 1–2 weeks at 4° C. A 6-week treatment was fairly effective. Cooling was best started at the flower bud differentiation stage. Bulbs planted after storage at room temperature for 4–6 weeks after treatment bloomed rather earlier than those planted immediately after treatment. Bulbs subjected to the 8–week treatment starting on 20 July bloomed between the latter part of December and the latter part of January according to variety.

Lawns.

(*See also* 884q.)

849. Elder, W. C.
Turf grasses. Their development and maintenance in Oklahoma.
Bull. Okla agric. Exp. Stat. **B-425,** 1954, pp. 32, illus.

A study of turf grasses and turf management was started at the Oklahoma Experiment Station in 1948, and this bulletin reports the results of the first 3 years' work with respect to: (1) grass species for use under different soil and climatic conditions; (2) methods of establishment and maintenance, the latter including the problem of mowing height and the use of fertilizers, water and turf aerating machinery; and (3) certain special problems including the control of bermuda grass on golf greens, grasses for shady areas, and the control of weeds in turf. Information is tabulated on the establishment and maintenance of 26 turf grasses.

850. Entomology Research Branch, U.S. Agricultural Research Service.
Chinch bugs: how to control them.
Leafl. U.S. Dep. Agric. **364,** 1954, pp. 8, illus.

Chinch bugs damage plants of the grass family over wide areas of the U.S.A. One species, *Blissus leucopterus*, attacks cereals and two others, *B. hirtus* and *B. leucopterus insularis*, infest lawn grasses. The insects and their life histories are described. For control on lawns and golf courses up to 3 applications, as sprays or dusts, of chlordane, DDT or dieldrin may be needed, using recommended formulations and rates of application. This leaflet supersedes Farmers Bulletin 1780.

Orchids.

(*See also* 448.)

851. Henderson, M. R. (Pestana, J. L.).
Orchids.
A.R. Singapore bot. Gdns Dep. 1953, 1954, pp. 4-6.

Orchid seedlings raised in flasks have grown 2 to 3 times faster in media containing such organic substances as urine and fish extracts as in the standard Vacin's medium, which is a mixture of inorganic salts and sugar in agar-agar. The use of mercuric chloride to disinfect cotton wool flask plugs, though effective against fungus infection, caused orchid seedlings to turn yellow. The weekly application of an NPK mixture to orchid seedlings, 1 to 8 cm. tall, resulted in marked growth increases compared with controls receiving water only. [No details of treatments and results are given.]

852. Mott, R. C.
Effect of soil mixtures on root growth of *Paphiopedilum* orchids.
Bull. N.Y. St. Flower Grs, 1954, No. 107, pp. 1-2, bibl. 2, illus.

The responses of cymbidium orchids to 10 different potting media were reported earlier [*H.A.*, 24: 4125]. The same treatments were tested concurrently for *Paphiopedilum* (*Cyprepedium*) *insigne*. Over a 2-year period the best root growth and condition of medium was shown by moss peat. Sawdust, sedge peat and soil-peat mixtures also produced better root growth than the standard osmunda-leaf mould-manure mixture. The average number of flowers produced by plants grown in moss peat were greater than for the other treatments.

Roses.

(*See also* 884e, z, 1143, 1144, 1153.)

853. Rowley, G. D.
The National Rose Species Collection.
J. roy. hort. Soc., 1954, **79**: 382-9, bibl. 6, illus.

The National Rose Species Collection at the John Innes Horticultural Institution, Bayfordbury, is described; planting was begun in 1949 under a scheme sponsored by the Agricultural Research Council. In the main species collection, 110 acceptable species and 20 natural hybrids are represented. There is also a collection of the wild roses of Great Britain, one showing a cross-section of the range of morphological characteristics, and a collection of some of the most popular stocks, on which cultural and compatibility trials are being carried out. Show beds illustrate how new roses have come into being, and the living genealogical tree of the rose family.

854. Anon.
Rosier. Études de porte-greffes. **(Rose rootstock studies.)**
Rapp. Cons. Exp. Rech. agron. Algér 1953, 1954, pp. 240-2.

The variety Michèle Meilland growing on 4 rootstocks was pruned on 15 October and subsequent winter flower production recorded for 10 bushes on each stock. On *Rosa indica major* 73 flowers were picked during December and January, but many were rather short-stemmed. On *R. sempervirens* the majority of the 76 flowers produced were harvested in December, and a high percentage had long stems. On Paul's Scarlet Climber only 44 flowers were produced, a fair proportion being long-stemmed. On Rêve d'Or flowering was negligible.

855. Widmoyer, F. B., and Sherwood, C. H.
Effects of soil mulches on greenhouse roses.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 462-4, bibl. 3.

Better Time roses were grown in greenhouse benches mulched with a 2-inch layer of ground corncobs, fresh sawdust or coarse vermiculite or without mulch. Mulch treatments resulted in no marked soil changes in water requirement, pH or available nutrients. Flower production was increased by 1 to 9% by the mulches, but the benefit was not statistically significant. It was associated with a higher available water-holding capacity of the soil, lower CO_2 content in the soil gases, and less extreme soil temperatures.—Iowa St. Coll., Ames.

Other trees and shrubs.

(*See also* 6, 31, 36, 101, 130, 148, 746, 884b, c, d, f, g, i, m, n, s, u, x, 1142.)

856. Scherrer, F., and others.
[The Azerca (azalea-erica-camellia) Association of Western Germany.] [In German.]
Gartenwelt, 1954, **54**: 265-80, illus.

The articles collected in this number of *Gartenwelt* discuss the experimental and advisory activities of Azerca, as well as such aspects of the culture of the three crops, as flower bud initiation in azalea, azalea forcing, raising camellias for sale as pot plants, diseases and pests of forced azaleas, and azalea, erica and camellia growing in several parts of the country.

857. Broertjes, C.
Zaadonderzoek. **(Seed investigations.)**
Jaarb. Proefstat. Boomkw. Boskoop 1953, pp. 76-82.

A summary of 5 years' research is given on methods of obtaining quick and regular germination of seeds of *Cotoneaster bullata*, *Ilex aquifolium*, and *Taxus baccata*. The results from the treatments used varied from year to year, but stratification generally gave good results. For *Taxus* cold water treatment was also promising. [See also *H.A.*, 24: 703.]

858. Dorsman, C., and Broertjes, C.
De invloed van kunstmatige belichting op zaailingen van azalea en coniferen. **(The influence of artificial light on seedlings of azalea and conifers.)**
Jaarb. Proefstat. Boomkw. Boskoop 1953, pp. 59-60, illus.

When seedlings of *Sciadopitys* and *Araucaria* were grown under continuous strong light, their growth at first was somewhat quicker than that of seedlings grown under normal day-length, but there was no apparent difference after 3–4 months. Growth of azalea seedlings under continuous light in winter was sufficiently fast to suggest that a saving of about 1 year could be effected in the production of saleable plants.

859. Anon.
De invloed van de zuurgraad (pH) van de grond op de ontwikkeling van verschillende gewassen. **(The influence of soil pH on the development of different crops.)**
Jaarb. Proefstat. Boomkw. Boskoop 1953, pp. 23-7.

At Boskoop soil pH did not affect the percentage strike of winter cuttings of *Hydrangea arborescens* but a low pH favoured shoot growth. Winter cuttings of *Cornus alba sibirica* showed greatest branching and rooting, and highest percentage strike at pH levels of 4·5 and 4·95. In a humus-rich, silty sand from Oudenbosch 1-year-old plants of *Aesculus hippocastanum* showed poor growth and relatively high mortality at low pH levels. 2-year-old *Carpinus betulus* plants showed the lowest mortality and best development in the pH range 5·25 to 6·4. For 1-year-old *Fagus sylvatica* plants a pH of 5·7 was probably the most suitable but the results were somewhat affected by drought conditions. A list is appended which gives the best pH values for several ornamental crops.

860. Fillmore, R. H.
Open frame propagation of cuttings under mist.
Amer. Nurserym., 1954, **100** (4): 12-13, 67-74, bibl. 12, illus.

In Iowa an outside mist-propagating unit was made by providing drainage and screening for a cold frame; the frame was filled with sand, and a spray line set above it. Cuttings of deciduous shrubs were taken in June, and the mist was operated practically 24 hours a day until mid-August. The species used and their rooting performance under these conditions are listed. Survival after rooting was a serious problem at first. Young plants of *Hydrangea arborescens grandiflora* were successfully established, however, by gradually reducing the number of hours per day during which the mist was operated, starting 1 month after the cuttings had been set in the propagator.

861. McNitt, V. J.
Top-grafting technique uses plastics.
Amer. Nurserym., 1954, **100** (6): 19, 63-5, illus.

Woody ornamentals considered extremely difficult to handle, including 2 rare larches, responded readily to the new outdoor method of propagation described. The veneer or side graft is used and the scion is set in the stock low enough to enable a plastic cover to be tied to the stock over the top of the scion. The union is bound with plastic grafting tape, damp sphagnum is placed around it and the scion and adjoining portions of the stock enclosed in a plastic tube of 0·002 in. polyethylene film. The plastic tube is covered with muslin to provide shade. When the scion begins to grow the top tie is loosened first, and gradually all grafting aids are removed. Cutting out the original stock top depends on the size of the plant; in the case of a young tree it may be accomplished in one season, but where older stocks are used it should be spread over 2 or more years.

862. Hoffmann, A., and Kirschner, K.
Über Fragen der Anschüttung grosser Bäume. **(On raising the soil level around large trees.)**
Dtsch. Gartenb., 1954, **1**: 339-41, bibl. 7, illus.

From time to time various operations may make it necessary to raise the soil level around large trees. Observations suggest that survival of the trees depends on sufficient aeration of the roots. Recommendations are made on the nature of the material to be used around the trees and on the inclusion of air shafts.

863. Morishita, F. S.
Biology and control of *Brevipalpus inornatus* (Banks).
J. econ. Ent., 1954, **47**: 449-56, bibl. 15, illus.

The host range of privet mite includes many ornamental and other plants of horticultural importance. In tests at the University of California heavy infestations of privet mite on aralia, ivy and azalea were very satisfactorily controlled with chlorobenzilate (Geigy 338, 4,4′-dichlorobenzilic acid ethyl ester), DMC and Diazinon. Aramite and Ovotran also gave good results.

864. Kiplinger, D. C.
Azaleas.
Flor. Exch., 1954, **123** (15): 19.

Some essentials for the successful culture of azaleas in the U.S.A. are discussed, the subjects dealt with including soils, nutrition, bud formation, pinching, light and temperatures.

865. Black, M., and Wareing, P. F.
Photoperiodic control of germination in seed of birch (*Betula pubescens* Ehrh.).
Nature, 1954, **174**: 705-6, bibl. 4.

Germination tests with birch seed showed that the same photo-reaction is involved in both unchilled, light-sensitive seeds and in unchilled, light-sensitive birch buds.—Univ. of Manchester.

866. Dorsman, C., and Ravensberg, K.
Kunstmatige belichting bij het zetten van berken. **(Artificial lighting for birch grafts.)**
Jaarb. Proefstat. Boomkw. Boskoop 1953, pp. 65-7.

Supplementary light at night was shown to give quicker and better unions between *Betula pendula* and *B. pubescens* rootstocks and scions of *B. youngii*.

867. Hildebrand, E. M.
Camellia variegation in Texas.
Plant Dis. Reptr, 1954, **38**: 566-7.

Variegation, an extremely common feature in camellias, was shown to be of virus origin by Plakidas in Louisiana. It is spread through propagation practice.

868. Rincón Toledo, D. J.
Biología y control del *Gynaikothrips uzeli* Zimm. en el valle del Cauca. **(Biology and control of *Gynaikothrips uzeli* in the Cauca valley.)** [English summary ½ p.]
Acta Agron. Palmira, 1954, **4**: 127-42, bibl. 8, illus.

This pest attacks the terminal leaves of *Ficus retusa*. It lives inside these and is thus difficult to eradicate.

Experiments showed that effective control can be obtained by applying a defoliant at a strength sufficient to cause the fall of the young rolled leaves, which are then burnt, followed by DDT 4 days later and subsequently three times at fortnightly intervals, and thereafter by DDT and DDT plus BHC alternately at longer intervals.

869. Connors, C. H.
Parthenocarpy in holly.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 453-6, bibl. 1.

A natural tendency to parthenocarpy exists in *Ilex aquifolium*, *I. cornuta*, *I. pernyi*, *I. vomitoria*, *I. cassine*, *I. attenuata* and *I. myrtifolia*. It appears to be rare in *I. opaca* in the east and north-east United States. Where pollination by insects is lacking and a tendency to partial parthenocarpy exists, fruit set can be increased by use of a suitable growth substance spray. In these experiments a satisfactory set was obtained by several applications of 2,4-D at 2- to 5-day intervals. The sprays were most effective when applied to the open flowers.—Rutgers Univ., N.J.

870. El Hakim, S.
Inducing rooting with growth substances on Arabian jasmine (*Jasminum sambac* Ait).
Proc. Amer. Soc. hort. Sci., 1954, **63**: 469-72, bibl. 2, illus.

Cuttings of the Arabian jasmine (*Jasminum sambac* Ait.) were made on 1 February and 1 March from 1-year-old and 2-year-old branches. The bases of the cuttings were soaked in aqueous solutions of indoleacetic acid for 24 hours in the dark. Under the conditions of these experiments, the optimum concentration of indoleacetic acid for rooting was 25 p.p.m. Cuttings made from 2-year-old branches gave a somewhat better rooting response than those made from 1-year-old branches. Cuttings made on 1 February rooted slightly better than those made on 1 March. [Author's summary.]—Ibrahim Univ., Egypt.

871. Boyko, E.
A new method of propagation for *Magnolia grandiflora*.
J. roy. hort. Soc., 1954, **79**: 541.

A case is recorded from Israel in which a leaf taken from a shoot of *M. grandiflora* that had just flowered formed roots when kept in water in semi-darkness.

872. de Boer, S.
Bestrijding van schurft op sier-*Malus*. **(The control of scab on ornamental *Malus* spp.)**
Jaarb. Proefstat. Boomkw. Boskoop 1953, p. 17.

Spraying trials in 1953 confirmed earlier results [*H.A.*, 24: 721] which showed that scab on *Malus* species could be controlled by 1 or 2 early copper sprays followed by lime-sulphur. A mercury spray applied as a curative measure 4 days after infection gave similar results.

873. de Vogel, P.
Proeven over het enten van blauwe sparren. **(Experiments on the grafting of blue spruce.)**
Jaarb. Proefstat. Boomkw. Boskoop 1953, pp. 31-5.

Trials were carried out in 1952 and 1953 on the grafting of *Picea pungens glauca* strains on *Picea abies*. In both years a higher percentage take and better growth was shown by grafts under clear glass screened in sunny weather, than by those under whitewashed, screened glass. The best grafting date in 1952 was about 14 August, but in 1953 grafting dates did not affect results.

874. Waterman, A. M., and Aldrich, K. F.
Additional information on the surface sterilization of poplar cuttings.
Plant Dis. Reptr, 1954, **38**: 96-100.

A detailed account is given of the technique used and results achieved in the sterilization of poplar cuttings in 1952. Preliminary tests show that of the 5 sterilizing agents tested Semesan and Ceresan M are effective and that they are non-toxic to cuttings that have been stored for a short period before planting in the glasshouse.

875. Ford, H. F., and Waterman, A. M.
Effect of surface sterilization on survival and growth of field-planted hybrid poplar cuttings.
Plant Dis. Reptr, 1954, **38**: 101-5.

The work of Waterman and Aldrich noted in the previous abstract was taken one stage further by observations on what is likely to happen in practice if cuttings treated as described were then stored, shipped and finally planted. Briefly it may be said that cuttings treated with Semesan proved superior in growth to those treated with mercuric chloride or with Ceresan M.

876. Demortier, G., and others.
Le développement des boutures de *Populus robusta*, Schneid. en fonction du pH et du rapport Ca/Mg. **(The development of cuttings of *Populus robusta* in relation to pH and the Ca/Mg ratio.)**
Bull. Inst. agron. Gembloux, 1954, **22**: 10-17.

In a series of pot experiments, cuttings of *Populus robusta* gave the best results in soils with a pH of more than 7 and a Ca: Mg ratio of about 10: 1. Ca and Mg applied as sulphates were generally superior to chloride applications.

877. Bowers, C. G.
Rhododendron seed germination in agar nutrient solution.
Nat. hort. Mag., 1954, **33**: 206-8, bibl. 4, illus.

The laboratory method of germinating orchid seeds devised by Knudson (*Bot. Gaz.*, 1922, 73: 1-25 *et seq.*) has been successfully applied at Cornell University to germinating valuable seeds of rhododendrons. The method, which is fully described, involves sterilizing the seeds in a solution of calcium hypochlorite and germinating them under sterile conditions on a sugar-agar medium (Knudson's "Solution C") in test tubes held at 70° F. Germination occurs in about 2 weeks, and, when the first true leaves have formed, the seedlings are pricked out into seed boxes containing granulated peat moss.

878. RAVENSBERG, K.
De invloed van temperatuur en luchtvochtigheid op het slagen van stek in bakken met dubbel en enkel glas. (**The influence of temperature and humidity on the take of cuttings in frames with double and single glass.**)
Jaarb. Proefstat. Boomkw. Boskoop 1953, pp. 46-51.

Propagating frames with double glass had a higher night temperature and this induced better rooting of *Rhododendron catawbiense grandiflorum* cuttings than occurred in frames with single glass. [See also *H.A.*, 24: 730.]

879. WELLS, J. S.
New thoughts on propagating rhododendrons.
Amer. Nurserym., 1954, **100** (5): 15, 83-90, illus.

In addition to such basic factors as type of cutting, wounding, hormone treatment, medium and humidification, timing appears of vital importance for the rooting of rhododendron cuttings. In New Jersey, the season starts about the 3rd week in July, but weather, growth of stock plant and variety may affect this date. A table is presented showing the best time to take cuttings from 27 varieties, the most suitable hormone treatment applied and the best percentage of well rooted cuttings obtained.

880. WELLS, J. S., AND MARTH, P. C.
Evaluation of halogen-substituted phenoxyacetic acids and other growth regulators in rooting rhododendron and *Ilex*.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 465-8, bibl. 6.

In the present 2-year study several compounds chemically related to 2,4-dichlorophenoxyacetic acid and 2,4,5-trichlorophenoxyacetic acid induced rooting of 70 to 100% of treated cuttings of the Dr. Dresselhuys variety of rhododendron. Although many of the phenoxy compounds tested were not effective, 2,4,5-trichlorophenoxy alpha propionic acid (2,4,5-TP) was outstanding in 1951 and 1952. A talc dust mixture containing 1% concentration of 2,4,5-TP induced 70 to 100% rooting of the Dr. Dresselhuys and E. S. Rand varieties of rhododendron and 100% of *Ilex opaca* holly cuttings. All developed into healthy plants when potted. [From authors' summary. See also *H.A.*, 24: 718 and 731.]—Koster Nursery, Bridgeton, N.J., and U.S. Dep. Agric., Beltsville.

881. DE BOER, S.
Bladvlekkenziekte van rhododendron. (**Rhododendron leaf spot.**)
Jaarb. Proefstat. Boomkw. Boskoop 1953, pp. 13-15, illus.

The causal agent of rhododendron leaf spot has been identified as *Cercospora handelii*. Laboratory tests with fungicides showed that fungus growth was inhibited by Aagrano at concentrations above 0·15%, and by 0·5% Spergon. Rhododendron plants on *R. ponticum* rootstock, sprayed with Aagrano at 0·1% to 0·08% showed no damage. By spraying plants with 0·2% Aagrano soon after spore dispersal new infections were controlled.

882. KEEN, R., AND CHADWICK, L. C.
Warn propagators to watch for sex reversal in *Taxus*.
Amer. Nurserym., 1954, **100** (6): 13-14, illus.

Yew is normally dioecious, but occasionally twigs of the opposite sex occur on some plants. These twigs should not be used for propagation as the character of the plants raised from them would differ from the original, recognized forms. Clones of *Taxus baccata*, *T. media* and *T. cuspidata* grown only as male or female plants respectively are listed.

883. GRANT, P. J.
Tree ferns in cultivation.
N.Z. Gdnr, 1954, **10**: 758-64, illus.

Following a discussion of the natural distribution and habits of the 8 New Zealand tree fern species described earlier [*H.A.*, 24: 4160], the author outlines their propagation from spores or, in 2 cases, from runners, and their collection, choice of site and planting.

Noted.

884.

a ANON.
Quelques applications de la vermiculite en horticulture. (**Some horticultural uses of vermiculite.**)
Rev. hort. Algér., 1954, **58**: 153-6.

b ARISTEGUIETA, L.
Arboles de Venezuela. *Pseudocassia spectabilis* (DC) Briton and Rose. (**Trees of Venezuela. *Cassia spectabilis*.**)
Agric. venezol., 1953, **18** (165): 22-4, illus.
Distribution, characters and phenology.

c ARISTEGUIETA, L.
El castaño *Pachiro insignis*. (**The "chestnut", *Pachiro insignis*.**)
Agric. venezol., 1954, **19** (169): 22-5, illus.
An ornamental.

d ARISTIGUIETA, L.
El apamate. *Tabebuia pentaphylla*. (**The apamate tree, *Tabebuia pentaphylla*.**)
Agric. venezol., 1954, **19** (168): 22-6, illus.
Ornamental bignoniaceous tree.

e B., S.
La rosa "Lawrence Johnston" "Premio di Roma" 1954. (**The Lawrence Johnston rose, winner of the "Premio di Roma" in 1954.**)
Riv. Ortoflorofruttic. ital., 1954, **37**: 293-4, illus.

f BANERJEE, M. L.
Note on the distribution of rhododendrons in Nepal.
Sci. and Cult., 1954, **20**: 92-3, bibl. 9.
Distribution of species as affected by mountain barriers.

g BLASER, J. LEC.
The morphology of the flower and inflorescence of *Mitchella repens*.
Amer. J. Bot., 1954, **41**: 533-9, bibl. 26, illus.

h CARRA, P.
Les plantes d'aquarium. **(Aquarium plants.)**
Rev. hort. Algér., 1954, **58**: 162-4.
Seventeen aquarium plants and their culture in Algeria.

i HAHN, E.
Les gardénias **(Gardenias.)**
Rev. hort. suisse, 1954, **27**: 281-4.
Commercial culture.

j JANK, H.
Zur Frage des "Sportens" beim *Chrysanthemum indicum*. Die Auswirkung von Mutationen bei morphologischen und physiologischen Merkmalen. **(On sports in *Chrysanthemum indicum*. The morphological and physiological expression of mutations.)**
Dtsch. Gartenb., 1954, **1**: 327-30.
Points to be considered in chrysanthemum selection.

k JEFFERS, R. H.
The horticultural trade: 1804-1954.
J. roy. hort. Soc., 1954, **79**: 519-28.
Of ornamentals in Britain.

l JELLICOE, G. A.
Garden design in England, 1804-1954.
J. roy. hort. Soc., 1954, **79**: 488-95, illus.

m KOSUGI, K.
Studies on flower bud differentiation and development in some ornamental trees and shrubs. II. On the time of flower bud differentiation in *Enkianthus perulatus* C. K. Schneid. and *Serissa japonica* Thunb. [Japanese, with English summary 5 lines.]
J. hort. Ass. Japan, 1954, **23**: 53-6, bibl. 4, illus.

n KRAUSE, W. G. C.
Ways of forcing lilac.
Comm. Gr., 1954, No. 3066, pp. 644-6, illus.
Varieties and methods, mainly in Holland.

o MATHER, J. C.
Two chemical controls for bulb fly.
Grower, 1954, **42**: 736.
See also *H.A.*, 24: 4114.

p MEAHL, R. P., LITTLE, L. D., Jr., AND ATMORE, S.
1953 Petunia trials.
Progr. Rep. Pa agric. Exp. Stat. **122B,** 1954, pp. 8, illus.
Many varieties described.

q MINISTRY OF AGRICULTURE, LONDON.
Leatherjackets.
Adv. Leafl. Minist. Agric. Lond. **179,** amended 1954, pp. 4, illus.
Tipula paludosa and its control on crops and lawns.

r NICOLINI, G.
La fioricoltura italiana ed i suoi problemi. **(Italian floriculture and its problems.)**
Humus, 1954, **10** (9): 12-15, illus.

s ØSTERGAARD, J.
Ginkgo biloba L., Tempeltrae. Et bidrag til vor viden om artens forekomst og trivsel i Danmark. **(*Ginkgo biloba*, its distribution and development in Denmark.)**
Nat. Verd. Kbh., 1954, **38**: 156-69, bibl. 44, illus.

t OZAWA, H., AND KIKUGAWA, I.
The breeding and characters of the new stock variety Earliest White. [Japanese, with English summary 13 lines.]
Bull. hort. Branch Kanagawa agric. Exp. Stat., 1954, No. 2, pp. 74-82, bibl. 10, illus.

u PARRY, M. S.
Tree-planting in Tanganyika. IV.—Species for coastal areas.
E. Afr. agric. J., 1954, **20**: 49-53.
Including ornamentals and hedge trees.

v SAITO, K.
Studies on the induction of polyploid flower plants and their utilization. IX. On the characteristics of a newly induced tetraploid semi-double flowering strain of cosmos Orange Ruffles. [Japanese, with English summary 8 lines.]
J. hort. Ass. Japan, 1954, **23**: 31-4, bibl. 2, illus.

w SEALY, J. R.
Review of the genus *Hymenocallis*.
Kew Bull., 1954, No. 2, pp. 201-40, bibl. numerous in text.
Preliminary critical revision with key to species.

x STEYERMARK, J. A.
***Columnea stenophylla*.**
Nat. hort. Mag., 1954, **33**: 212-15, illus.
Including growth habits and propagation by cuttings.

y SYNGE, P. M.
The publications of the Royal Horticultural Society, 1804-1954.
J. roy. hort. Soc., 1954, **79**: 528-36.
A historical review.

z THOMAE, K.
Rosen-Früchte. **(Rose fruits.)**
Dtsch. Baumsch., 1954, **6**: 266-71, illus.
Fruits of 63 rose species described with diagrams.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 1152, 1155, 1164.)

885. Anagnostopoulos, P. T.
The arboricultural Greece. (Symposium of arboricultural instructions.) [Greek, with English summary.]
[*Publ.*] *Superior School Agric. Athens*, 1954, pp. 101, bibl. 15, illus.

The chief crops under consideration are olives, citrus, figs and pistachios. For each of these advice is given on planting, varieties, soil cultivation, fertilization, irrigation, pruning and crop protection, and in the case of the olive, on methods of improving bearing and of controlling *Dacus oleae*. In conclusion, the need for increased production and improved methods is stressed and an example is given of a smallholding in which fruits, vegetables and other crops are well balanced.

886. Channa Basavanna, G. P.
Important insect pests of fruit crops—nature of damage and control.
Mysore agric. Calendar 1954, 1954, pp. 96-103.

The most common and serious pests of citrus in Mysore are the stem borer (*Chelidonium cinetum*) and the citrus butterfly (*Papilio demoleus*). Twigs containing the stem borer may be removed, but when the pest enters the branches and trunk a fumigatory insecticide must be used. A spray of calcium arsenate will control the caterpillar stage of the butterfly. Leafhoppers (*Idiocerus* spp.) are the most serious pests of mangoes; they may be controlled by DDT 50% wettable powder. On guava, the capsid bug *Helopeltis antonii* is a common and often serious pest causing blisters on the fruits. Effective control may be obtained by applying BHC sprays when the blossoms appear followed by a second spray 3 weeks later. Figs are often attacked by mites, *Eriophyes* spp., which are successfully controlled by a sulphur dust. The pests of plantain, jack fruit, pomegranate, grape and apple occurring in Mysore are also mentioned.

Avocadoes.

(*See also* 506, 907, 921, 985a, e, n.)

887. Ruehle, G. D.
Avocado production on Florida sands.
Citrus Ind., 1954, **35** (8): 10-13.

The current average annual production of avocadoes grown on the sandy soils of Florida is 400,000 bushels, but this figure is expected to be increased within the next decade. The varieties which succeed best are Lula, Taylor, Booth-7, Booth-8, Avon and Tonnage, although none of these are considered to be entirely satisfactory. In a small test in Florida, 2 avocado varieties grew more vigorously on Lula seedling stocks than on Waldin stocks. The usual spacing is 25×25 ft., but wider spacing is recommended for the scab-susceptible variety Lula.

888. Martin, J. P., and Bingham, F. T.
Effect of various exchangeable cation ratios in soils on growth and chemical composition of avocado seedlings.
Soil Sci., 1954, **78**: 349-60, bibl. 17, illus.

Greenhouse studies were carried out on the influence of varying percentages of exchangeable Na, K, H, and Ca, and of excess lime on avocado seedlings. Seedling growth was not significantly different in acid, base-saturated and lime-containing soils. Avocadoes were shown to be sensitive to relatively low percentages of exchangeable K and Na. In soils with a relatively low exchange capacity, K and Na injuries and growth reduction were less than in similar soils with a high exchange capacity. In Topa Topa seedlings, leaf injury was caused by 4% exchangeable Na and by 13% K; 12% exchangeable K reduced growth of Mexicola seedlings and 23% caused leaf burn. Soil concentrations of Na affected K movement within the plant rather than K absorption; increasing soil Na increased leaf K, but decreased root K. Leaf Mn concentrations were increased by increasing soil K or Na, but decreased by increasing Ca.—Calif. Citrus exp. Stat., Riverside.

889. Volcani, Z.
Bacterial soft rot of avocado fruit.
Nature, 1954, **174**: 604-5, bibl. 3.

A bacterial soft-rot disease in avocado fruits was found for the first time in 1953 in Israel. Various vegetables inoculated with the causal organism under laboratory conditions developed a typical soft rot of the parenchyma; no infection was induced on avocado leaves or on lemon fruits. The organism is closely related to the *Erwinia carotovora* group. It is a wound parasite and requires relatively high humidity to induce infection. Its optimal growth and pathogenicity temperature is 30–32° C.; no infection occurs above 38° or below 12° C.—Agric. Res. Stat., Rehovot.

890. Gustafson, C. D.
Avocado soil fumigation.
Calif. Citrogr., 1954, **39**: 415.
Fumigation of avocado soils.
Calif. Agric., 1954, **8** (11): 10.

Effective control of *Phytophthora cinnamomi* was obtained by soil fumigation with methyl bromide, but because of damage to avocado trees, which became apparent 10 days after the treatment, it would seem that fumigation will have to be restricted to unplanted soils or used to create barriers around infected areas in orchards.

Citrus—general.

(*See also* 985f, g, j, 992.)

891. Robbie, J., and Fisher, F. W.
Commercial horticulture in the Sudan. 1. Citrus cultivation.
Bull. Minist. Agric. Sudan **10**, 1954, pp. 48, illus.

The main citrus-growing areas of the Sudan are in the Northern, Khartoum and Blue Nile Provinces, but the industry is still in its infancy and local demand exceeds production. This bulletin contains chapters on varieties of citrus grown in the Sudan, nursery and cultural practices, harvesting, pests and diseases, and economics.

892. Blanc, L., Chapot, H., and Cuénot, G.
Agrumes et fruits subtropicaux aux U.S.A. **(Citrus and subtropical fruits in the U.S.A.)**
[*Publ.*] *Inst. Fruits Agrumes colon.*, 1952, pp. 189, illus., bibl. numerous [received 1954].

This report is the result of a study tour in 1951 of citrus research stations and growing areas in Florida, Texas and California. In addition, there are shorter sections on pistachios and vegetables at Beltsville, fruit and vegetable growing in southern Florida, date growing in California, and other subtropical fruits. As regards citrus comparisons are made between the 3 States and also between America and Morocco. Two final pages are devoted to a consideration of citrus problems in Indo-China.

893. Hilgeman, R. H., and van Horn, C. W.
Citrus growing in Arizona.
Bull. Ariz. agric. Exp. Stat. **258,** 1954, pp. 35, illus.

About 20,000 acres of citrus are planted in two main areas in Arizona, the Salt River Valley and the Yuma Mesa. This bulletin describes these areas, the most suitable varieties of orange, grapefruit, lemon and mandarin, the establishment of young groves and of replants in mature groves, topworking, pruning, the growth of fruits in relation to time of harvest, cultivation and cover cropping, fertilization, irrigation, frost protection, and the control of pests and diseases.

894. Harris, R. J.
The propagation of citrus in the Keravat-Rabaul area.
Papua New Guinea agric. Gaz., 1954, **8** (3): 7-17, illus.

Citrus investigations at the Lowlands Agricultural Experiment Station, Keravat, since the war have been concerned with rootstocks, varieties, stock-scion relationships, nursery techniques and the control of diseases and pests. Among rootstocks rough lemon gives good results, and seville orange and lime (muli) are promising but trifoliate is not suited to local conditions. Notes are given on nursery practice, the planting out of budded plants, and the control of the chief diseases and pests.

895. Anon.
Why mandarin orchards deteriorate.
Indian Fmg, 1954, **4** (3): 12-13, 15, illus.

A survey of mandarin orchards in Wynaad and Coorg has shown that a rather high incidence of tree deterioration and death is due to a combination of factors, drought and malnutrition predominating and pests and diseases also playing a part. Observations suggest that conditions can be improved by mulching, the provision of shade trees, adequate manuring with FYM+NPKCa, and timely pest and disease control.

Citrus—varieties and rootstocks.

(*See also* 29, 914.)

896. Fujita, K., and others.
On the excellent strains of Satsuma orange in Kanagawa Prefecture. [Japanese, with English summary ¼ p.]
Bull. hort. Branch Kanagawa agric. Exp. Stat., 1954, No. 2, pp. 1-7, illus.

An account is given of the fruit characters, including storage behaviour, of two selections of Satsuma orange, Fujinaka, a bud sport, and Nishyama, a variety.

897. Yukawa, I., Watanabe, Y., and Yagi, T.
Effects of different rootstocks on the storage qualities of Satsuma orange. I. Storage life and chemical composition. [Japanese, with English summary ¼ p.]
Bull. hort. Sect. Kanagawa agric. Exp. Stat., 1953, No. 1, pp. 45-50, bibl. 7.

Satsuma oranges from trees growing on 6 rootstocks were compared. The best juice characters (specific gravity, vitamin C, citric acid, sucrose, acidity) were found in fruit from trees on Kikoku (trifoliate orange). Fruit from trees on Yuzu (*Citrus junos*) had higher acidity and lower sugars. Fruit from trees on Komikan (*C. kinokuni*) showed a relatively low percentage of rotting in storage, associated with a wrinkling of the pericarp.

898. Singh, S., and Nagpal, R. L.
Rootstock trials in the Punjab. IV. The influence of different rootstocks on the vigour and cropping of Malta orange.
Indian J. agric. Sci., 1954, **24**: 73-109, bibl. 4.

A study was made of the relative vigour and yield of Malta Local and Malta Blood Red oranges grown on 5 different local rootstocks, namely, kharna khatta (*C. karna*), nasnaran (*Citrus* sp.), jatti katti (rough lemon), mitha (sweet lime) and mokari (citron) propagated from seed and from cuttings. The vegetatively propagated stocks gave earlier yields and, except for citron, greater vigour as measured by girth than the seedling stocks during the period of the experiment, viz. the vegetative phase and the first 4 years of cropping. For Malta Local, nasnaran, kharna khatta and rough lemon were the most vigorous seedling rootstocks and kharna khatta, nasnaran and rough lemon the most productive; rough lemon and kharna khatta were the most vigorous vegetatively propagated rootstocks and kharna khatta and rough lemon the most productive (nasaran was not propagated vegetatively). For Blood Red rough lemon was by far the most vigorous seedling rootstock and kharna khatta and rough lemon were the most productive; rough lemon was also the most vigorous and the most productive vegetatively propagated rootstock. Age for age Blood Red trees were smaller than Malta Local. [For parts I, II and III see *H.A.*, 12: 1402, 15: 248 and 19: 534.]

899. Gurgel, J. T. A., and others.
Influência de diferentes cavalos e da época de colheita no teor de vitamina C na laranja Natal. (**Effect of different rootstocks and harvesting dates on the vitamin C content of the Natal orange.**) [English summary ¾ p.]
An. Esc. sup. Agric. "Luiz de Queiroz" Piracicaba, 1953, **10**: 125-32, bibl. 1.

Fruits of the Natal orange (*Citrus sinensis*) growing on 3 different rootstocks were harvested at 3-weekly intervals between 18 April and 12 June inclusive. Their vitamin C content varied with both rootstock and harvesting date and the variation with harvesting date was different for each stock. The data presented show that with Serra d'Áqua (*C. sinensis*) as the stock the content decreased gradually in successive pickings, with limão francês (*C. reticulata*) it was much the same for the first 2 pickings and then fell sharply, and with rough lemon it rose and then fell again to the original level.

900. FORD, H. W.
The influence of rootstock and tree age on root distribution of citrus.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 137-42, bibl. 6.

A study of citrus feeder root distribution indicated clearly that feeder roots were not confined to the upper 4 ft. of soil as previously assumed but penetrated under certain conditions to depths below 17 ft. Trees on rough lemon rootstock growing in a deep well-drained Lakeland fine sand may have 50% of the feeder root system below 30 in. and 15% below 9 ft. Rough lemon roots were found to penetrate 14 to 17 ft. deep at 15 years of age and at 25 years the total amount of feeder roots was greater in the zone from 30–60 in. than in the 0–10 in. zone. At 18 years of age, sour orange feeder roots penetrated occasionally to a depth of 17 ft. in sandy soils. However, trees on rough lemon had more feeder roots below 30 in. than trees on sour orange. The feeder root system of grapefruit rootstock was confined to a depth of 7–8 ft., a condition that may explain certain of the undesirable characteristics of grapefruit stock. Temples on Cleopatra rootstock developed feeder roots to a depth of 17 ft. at 9 years of age. Sweet orange, with root penetration only 11 ft. deep at 15 years, had the greatest total weight of feeder roots per cubic foot of soil of any of the other rootstocks observed. Rough lemon feeder roots were found 25 ft. from the tree trunk with most of the feeder roots in the 30–60 in. zone. [From author's summary. See also *H.A.*, 24: 4186.]—Fla Citrus Exp. Stat., Lake Alfred.

Citrus—soils and orchard management.

(*See also* 66, 506.)

901. IVANOVSKAJA, A. A.
The growth and formation of lemon and orange in relation to soil. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1953, **93**: 175-7, bibl. 2.

Young lemon and orange plants raised from seed and from cuttings were grown in pots in chernozem and loess soils and in a mixture of the two soils. Loess, as compared with chernozem, retarded growth, particularly in the seedlings. Plants in the chernozem-loess mixture grew much better, and the development of oranges was almost as good as in the chernozem. It is concluded that in the Odessa region citrus cultivated in trenches with a loess base should be grown on orange roots.

902. MARLOTH, R. H.
Replanting old citrus orchard sites.
Fmg S. Afr., 1954, **29**: 319-23, 330, bibl. 12, illus.

On the basis of overseas findings and of information obtained in a survey made in South Africa, recommendations are made on the best procedure for interplanting citrus trees in established orchards and for replanting on old citrus sites. The causes of the poor growth of citrus planted on old citrus soil are discussed.

903. DEWOLFE, T. A., AND OTHERS.
Effects of mulches on citrus orchards.
Calif. Citrogr., 1954, **39**: 422, 436-7, bibl. 5, illus.

Studies have been made on the soil flora in an irrigated lemon grove under a mulch of wood shavings. A species of *Trichoderma* fungus was isolated and its parasitism on *Phytophthora citrophthora* and *P. parasitica* confirmed. Certain fungi which capture nematode larvae were also isolated including *Arthrobotrys oligospora* and *A. dactyloides*. *Dactylella gephyropaga* was found parasitizing *Trichodorus* nematode on cauliflower roots, and laboratory tests showed that it would also capture citrus nematodes. [See also *H.A.*, 24: 3066.]

904. OPITZ, K. W.
Progress report on pruning.
Calif. Citrogr., 1954, **39**: 388, illus.
Pruning and tree renovation in Tulare County orange orchards.
Citrus Leaves, 1954, **34** (9): 10, 29, illus.

Further results are given of trials on the rejuvenation of orange trees [see *H.A.*, 24: 3032]. In a grove of Valencias and Navels the size of fruits from "skeletonized" trees had increased 2 seasons after pruning. Valencia yields also increased but Navel yields were still below those of unpruned trees. In a Valencia grove where "skeletonization" had been less heavy, yields in the second season after pruning were estimated at twice those before pruning. There was an excellent growth response to "skeletonization" except in very weak trees. Heavy thinning without heading back did not stimulate as much growth as "skeletonization". Light terminal clipping and dead brush removal produced a quicker growth response than heavy thinning.

Citrus—composition and nutrition.

(*See also* 73, 985q.)

905. NAUDE, C. J.
Fertilization of citrus.
Fmg S. Afr., 1954, **29**: 351-7, 371, illus.

Deficiencies of N, P, K, Mg, Ca, Zn, Cu, Mn, and Fe have been found to occur in South African citrus. An account is given of the symptoms caused by these deficiencies, their control by ground or spray applications, the problems posed by N/P and K/Mg interactions and the role of green-manuring.

906. CAMERON, S. H., WALLACE, A., AND MUELLER, R. T.
Seasonal changes in dry matter and nutrient composition of bearing Valencia orange trees.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 59-66, bibl. 6.

Data relating to the dry weight and mineral element composition of 36 bearing Valencia orange trees excavated at 3-week intervals throughout a 2-year period are presented and discussed. Evidence of seasonal or yearly changes in the content of nutrient elements in several tree fractions and the total tree is presented. From one-third to one-half of the nutrient elements of the tree were in the leaves. This, together with evidence previously obtained that a substantial proportion of the constituents of the leaf return to the tree prior to leaf fall [see *H.A.*, 22: 2948], lead to the conclusion that the leaves constitute an important reservoir of these materials within the tree. Positive correlations between pairs of nutrient elements suggest that most elements tend to vary simultaneously within the tree as a whole. However, negative correlations for some element pairs in some fractions suggest that not all parts of the tree behave alike. [Authors' summary.]—Univ. Calif., Los Angeles.

907. Wallace, A., and Smith, R. L.
Nitrogen interchange during decomposition of orange and avocado tree residues in soil.
Soil Sci., 1954, **78**: 231-42, bibl. 23.

The results are given of 5 experiments designed to determine the extent to which N from tree materials becomes available in the soil for re-use by plants and the extent to which gaseous losses of N occur. N isotopes were used to determine recovery by corn plants. Although avocado leaves decompose much more slowly than citrus leaves, the results showed that, under favourable conditions, decomposition was rapid in terms of organic matter loss but not in terms of nitrate production. By contrast, considerable nitrate-N production occurred as orange leaves decomposed. The addition of a moderate level of inorganic N to the leaves resulted in greater recovery of N from the leaves of both species than occurred when no inorganic N was added, but the addition of a high level of inorganic N depressed the recovery rate.

908. Sharples, G. C., and Burkhart, L.
Seasonal changes in carbohydrates in the Marsh grapefruit tree in Arizona.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 74-80, bibl. 9.

A study was made of the variation and distribution of starch and total soluble carbohydrate in Marsh grapefruit trees under two levels of nitrogen nutrition: 1. The initiation of spring growth and blossoming were shown to be exhaustive of reserve carbohydrate in regions of the tree nearest to the meristems. 2. The critical temperature at which starch begins to be converted to soluble carbohydrate during the winter was shown to be approximately 55° F. 3. A mechanism appeared to be in operation which is capable of protecting the more delicate parts of the tree against freezing injury during the winter. 4. Starch reserves were shown to be greater during periods of accumulation in shoots and roots of normal healthy trees than in trees starved for nitrogen. [Authors' summary.]—Ariz. agric. Exp. Stat., Tucson.

909. Zidan, Z. I., and Wallace, A.
Concentrations of five nutrient elements in orange fruits collected at different stages of maturity.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 53-8, bibl. 4.

Changes in the mineral composition by monthly intervals of Washington Navel and the Valencia orange fruit grown under two nitrogen levels were studied. The N, P, K, and Mg contents determined as percentages of the dry weight decreased throughout the season except for slight increases in N, P, and K in the months following February, when fruits were nine months old. Ca content reached a maximum in October, a minimum in March, and then increased slightly. The absolute amounts of the nutrients per fruit increased throughout the season, even after horticultural maturity. With both varieties the fruits from trees high in N were, on the average, lower in P, Mg, and Ca than those from trees low in N. The Washington Navel fruits high in N were lower in K than those low in N. This was not true for Valencia fruit. [From authors' summary.]—Univ. Calif., Los Angeles.

910. Chen, W. C. C.
Studies on the absorption of nitrogen by citrus from foliar applications of urea.
[English, with Chinese summary 1½ pp.]
Mem. Coll. Agric. nat. Taiwan Univ., 1954, **3** (3): 43-63, bibl. 12.

The results of experiments made on Duncan grapefruit trees at the Citrus Experiment Station, Lake Alfred, Florida, in 1950/53 are summarized by the author as follows: (1) Citrus leaves absorb and assimilate nitrogen from sprays of urea. (2) Concentrations of spray solution higher than 20 lb. of urea per 100 gal. of water cause injury to citrus leaves. (3) The use of higher concentrations of urea spray made possible by the protective action of sucrose resulted in greater increase in leaf N, although at any given concentration of urea the addition of sucrose reduced somewhat the absorption of nitrogen from urea. (4) One and two applications of urea at rates of 10 lb. or less per 100 gal. produced no measurable responses, but three or more applications even when used at a rate of 5 lb. per 100 gal. caused increases in N content of leaves. This increase was progressively greater as the number of spray applications increased. (5) Addition of a wetting agent to the spray solution markedly increased the absorption of urea N by leaves. This effect was further increased by addition of a sticker. (6) Leaves low in N showed a greater efficiency of N absorption from urea sprays than leaves high in N, when efficiency is measured by the percentage N increase relative to the initial N level of the leaves. (7) Absorption from urea sprays is significantly greater below pH 5·0 and above pH 9·0 than at pH 8·0, which is close to the reaction of an unbuffered urea solution. (8) For equivalent amounts of N applied, little difference was found in the total increases in leaf N between applications to the soil and to the leaves. However, during the first two weeks after application the response was more rapid to foliar applications, while soil applications produced a more lasting effect and gave higher values after the third week. (9) Absorption of N from urea sprays was readily measured within an hour after application, and continued for at least 7 days at a steadily decreasing rate.

911. Jones, W. W.
Biuret toxicity of urea foliage sprays on citrus.
Science, 1954, **120**: 499-500, bibl. 7, illus.

Both urea in pellet form and biuret applied to young budded lemon and orange trees as foliar sprays or soil applications caused leaf injury in the form of yellow-tip. No such injury was caused by similar applications of crystalline urea. It is concluded that the warming of urea to make pellets causes some biuret to be formed and renders it somewhat phytotoxic.

912. Aldrich, D. G., and Buchanan, J. R.
Soil phosphorus supply in healthy and phosphorus-deficient citrus orchards in southern California.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 32-6, bibl. 13.

The water-soluble, acid-soluble, and total phosphorus contents of soils in a series of healthy and phosphorus-deficient citrus orchards in southern California have been investigated. A comparison of the phosphorus values obtained from soils of healthy and deficient orchards indicates no correlation between concentrations of water-soluble and acid-soluble phosphorus and the incidence of phosphorus deficiency in citrus. With one exception in this investigation, phosphorus deficiency in citrus can be correlated with a low total phosphorus supply. The one exception illustrates the importance of rootstock in determining the uptake of phosphorus from the soil, and the unsuitability of utilizing soil analysis alone as a means of assessing the soil-phosphorus requirements of citrus. A combination of leaf and soil analyses is suggested for determining the need of citrus for phosphorus fertilization. [Authors' summary.]—Calif. Citrus Exp. Stat., Riverside.

913. Haas, A. R. C., and Brusca, J. N.
Valencia fruit sizes increased.
Calif. Agric., 1954, **8** (8): 11, 15, illus.

Valencia orange trees on sour orange rootstock were grown in an outdoor culture of pure silica, and supplied with nutrient solutions in which the calcium acid phosphate concentration was varied. Fruit size increased as the concentration increased. The phosphate was found to be more effective when an adequate supply of Mg was available.

914. Gorton, B. S., Cooper, W. C., and Peynado, A.
Relation of calcium and potassium accumulation in citrus as influenced by rootstock and salinity of irrigation water.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 49-52, bibl. 9.

Rootstock affected the calcium, potassium, chloride and sulfate contents of citrus leaves; leaves of grapefruit on Cleopatra mandarin rootstock accumulated more calcium and magnesium and less potassium than those on sour orange. Increased calcium content of irrigation water increased the calcium content and decreased the potassium content of leaves of grapefruit grown on both rootstocks. Rootstock and salinity treatments affected the Ca/K ratio; leaves on grapefruit on Cleopatra mandarin rootstock had higher Ca/K ratios than did those on sour orange rootstock. Increased calcium content of irrigation water increased the Ca/K ratio. [Authors' summary.]—U.S. Dep. Agric. and Tex. agric. Exp. Stat.

915. Anon.
Fertilisation des agrumes. (**Citrus manuring.**)
Rapp. Cons. Exp. Rech. agron. Algér. 1953, 1954, pp. 35-40.

At Boufarik experiments showed that a phospho-potassic fertilizer applied by soil injection gave significant yield increases with Hamlin oranges. Fruit from this treatment, however, matured 1 month later than the controls as the result of a large increase in acidity. In experiments on clementines manganese deficient trees, having received manganese sulphate sprays for 3 years, gave a 40% increase in yield.

916. Chowdhury, S.
Deficiency diseases of citrus in Assam, India.
FAO Plant Prot. Bull., 1954, **2**: 151-3, illus.

Vein splitting in sour orange and shaddock due to boron deficiency occurs in one locality. It is controlled either by hoeing 1 lb. borax per tree into the soil just before the monsoon or by spraying with 1 oz. borax per 3 gal. water just before the monsoon and again 2 months later. The effects last 2–3 and 2 years respectively. *Mottle leaf* in loose-skinned mandarin due to zinc deficiency is prevalent wherever the species is grown. It is cured by 1–3 sprays of 10 lb. zinc sulphate and 5 lb. lime in 100 gal. water applied in February/March, May/June and September/October. The effect lasts 3–4 years. With soil application recovery was slow and sometimes uncertain. *Chlorosis* due to iron deficiency is found in loose-skinned mandarin and more rarely in Valencia orange and lime. In some cases effective control has been obtained by foliage spraying with iron salts, preferably ferrous sulphate, at 1 lb. per 100 gal. water in Fenruary/March and again in July/August, the effects lasting up to 2–3 years. Soil applications have occasionally been effective.

917. Ford, H. W., Stewart, I., and Leonard, C. D.
The effect of iron chelate on root development of citrus.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 81-7, bibl. 7.

Soil applications of iron chelated with ethylenediamine tetraacetic acid (EDTA) to iron-deficient citrus trees resulted in a significant increase in feeder roots. In general, chelated iron increased root growth in proportion to the degree of chlorosis. The increase in root growth was confined primarily to the zone below 10 inches. Changes in soil pH influenced the distribution of feeder roots throughout the entire root profile. In general, Fe EDTA chelate, in addition to eliminating leaf symptoms, resulted in rapid feeder root development when the soil environment was such that new feeder roots could survive. [From authors' summary. See also *H.A.*, 24: 4202.]—Fla Citrus Exp. Stat., Lake Alfred.

918. Wallihan, E. F., and others.
Orchard trials with iron chelates.
Calif. Citrogr., 1954, **40**: 28, 30-1, illus.

Iron chelates were applied to chlorotic citrus trees by soil applications, foliar sprays and trunk injections. Under Californian conditions where chlorosis is associated with soil pH values above 7 no beneficial effects were obtained and there was some phytotoxicity.

Citrus—growth phenomena and physiology.

(*See also* 690.)

919. Mirimanjan, V. A., and Holkina, N. A.
Physiological differences in the leaves of spring and summer shoots of citrus. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1953, **90**: 925-8, bibl. 4.

The water regime, vitamin C, soluble sugars, N and protein contents were studied in leaves produced on spring and summer flushes of lemon, orange and mandarin at Suhumi. It was found that the leaves of summer shoots differ from those of spring shoots; during the following winter they contained higher amounts of vitamin C, soluble sugars, N and protein and were more frost resistant. Further work on these lines to increase hardiness by directed nutrition is suggested.

920. Čaĭlahjan, M. H., and Nekrasova, T. V.
Characteristics of metabolism in the leaves of vegetative and fruiting branches of lemon grafts. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **96**: 661-4, bibl. 6, illus.

Buds from bearing trees of the lemon variety Novogruzinskiĭ were grafted on 3-year-old seedlings of the same variety, and buds from young seedlings were grafted on bearing trees. In each case branches were grown from both scion and rootstock. The following season about one-half of the grafted bearing scions flowered. Morphological differences observed between the vegetative and bearing branches are described. When leaves of the same age from both types of branch were analysed it was found that the chlorophyll content and peroxidase activity were higher in leaves of bearing branches, while starch, sugar and ascorbic acid contents and reducing activity were higher in those of vegetative branches. The data indicate that flowering and fruit production in citrus are apparently connected with a considerable increase of hydrolytic and oxidizing processes in the leaves.

921. Smith, R. L., and Wallace, A.
Preliminary studies of some physiological root characteristics in citrus and avocado.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 143-5, bibl. 13.

The respiration rates, cation-exchange capacity and exchangeable hydrogen of excised roots of citrus and avocado trees are tabulated and the results discussed. The roots used were from rough lemon, sour orange, Blackman sweet orange, L.V.W. Brown grapefruit, Rubidoux trifoliate orange and young Mexican and Guatemalan seedling avocadoes.—Univ. Calif., Los Angeles.

922. Anon.
La mise à fruits du clémentinier par incision annulaire. **(Fruiting induced in clementine trees by bark-ringing.)**
[*Mimeo.*] *Serv. Hort. Rabat* **14**, 1954, pp. 25, illus.

A report on bark-ringing tests [previously abstracted in *H.A.*, 24: 4210] is more fully explained. Many small trials were made in Morocco and Algeria, and in only 4 cases did the double ring incision fail to produce an economic increase in yield. Treatment resulted in some reduction in fruit size, earlier maturity and reduced numbers of seeds. Severe pruning of the trees is only advised when there is much old wood.

923. Čaĭlahjan, M. H., and Nekrasova, T. V.
The effect of ringing on growth and development of lemon seedlings. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **96**: 403-6, bibl. 10, illus.

Ringed branches of 2-year-old lemon seedlings of the variety Novogruzinskiĭ gradually died off, but when lanolin or lanolin and growth activators such as nicotinic acid and vitamin B_1 were applied to the cuts, the bark healed up and the branches grew but did not flower. In experiments on lemon seedlings in their 5th year cutting rings two-thirds round the circumference of branches plus the application, in lanolin, of the growth inhibitors maleic hydrazide, thiosemicarbazone of 2,4-dichlorobenzaldehyde and thiourea resulted in temporary retardation of growth and yellowing and some fall of leaves but also in the development of flower buds. Analyses have shown that the chlorophyll, protein and starch contents in leaves of ringed branches was reduced, and this is assumed to be connected with the increased use of nutrients by the meristems which is necessary for blossom bud differentiation.

924. Koto, M.
Experiment on bagging early Satsuma oranges (*Citrus unshiu* Marcovitch). [Japanese, with English summary 11 lines.]
Bull. hort. Branch Kanagawa agric. Exp. Stat., 1954, No. 2, pp. 12-15, bibl. 10.

In experiments in which early Satsuma oranges were bagged from 1 August to 18 October fruit colouring was affected by rays of certain colours transmitted by the bags but not by the colour of the bags. Colouring was accelerated by the rays transmitted by yellow and white paraffin paper bags, retarded by those transmitted by blue paraffin paper bags and newspaper bags, and little affected by those transmitted by red paraffin paper bags.

925. Stewart, W. S., and Parker, E. R.
Effects of 2,4-D and related substances on fruit-drop, yield, size, and quality of grapefruit.
Hilgardia, 1954, **22**: 623-41, bibl. 11, illus.

As a result of 34 field experiments conducted from 1947 to 1950 to study the effects of applications of 2,4-D and related substances on fruit-drop, yield, size, and quality of grapefruit in California, it was found that: (1) A water spray of 8 p.p.m. 2,4-D reduced mature fruit-drop an average of 44%. This response to 2,4-D occurred under a wide range of climatic and environmental conditions. (2) The 2,4-D spray used at 8 p.p.m. was more effective in reducing fruit-drop when applied in May than when applied in July. (3) Annual applications of 2,4-D for 3 years have shown no accumulative detrimental effects. (4) Applications of 2,400 p.p.m. 2,4-D as a kerosene aeromist at less than 10 gal. per acre were effective in reducing mature fruit-drop although this method cannot yet be recommended for commercial use. (5) A water spray of 8 p.p.m. 2,4,5-T was as effective as an 8 p.p.m. 2,4-D spray in reducing mature fruit-drop. (6) A spray of 25 p.p.m. naphthaleneacetic acid was not effective in reducing fruit-drop. A spray of 25 p.p.m. naphthoxyacetic acid was only slightly effective in reducing fruit-drop. (7) The 2,4-D sprays had no undesirable effects on the quality of the fruit which was mature, or nearly mature, at the time of spraying. (8) There was an increase in fruit size if a sufficiently concentrated 2,4-D spray was applied on trees bearing fruit less than 16 weeks old. (9) The fruit quality was lowered when trees bearing young fruit (less than 16 weeks old) were sprayed with 2,4-D at too high a concentration in relation to the stage of fruit growth. A lowering in quality as a result of an 8 p.p.m. 2,4-D spray was observed only in one experiment, where the application was made on trees in full bloom. (10) 2,4-D was found to be effective in reducing mature fruit-drop when applied in conjunction with other spray treatments. Thus far no agricultural spray chemical has been found with which 2,4-D was not effective in reducing fruit-drop. (11) Application of 8 p.p.m. 2,4-D to trees with young, expanding leaves induced a curling and deformation of the leaves. Subsequent leaf growth was normal. Application of the spray between leaf growth flushes minimized the distortion. No influence on yield or fruit quality was noted as a result of the leaf curl. (12) The differences in fruit-drop resulting from the use of various forms of 2,4-D were not great. [Authors' summary and conclusions. For previous reports see *H.A.*, 22: 1796 and 23: 1148 and 1149.]—Calif. Citrus Exp. Stat., Riverside.

926. Day, B. E., and Erickson, L. C.
Relative effectiveness of the mono-, di-, and trichlorophenoxyacetic acids in preventing abscission of lemon leaves.
Bot. Gaz., 1954, **115**: 285-8, bibl. 8, illus.

All the ring-substituted mono-, di-, and trichlorophenoxyacetic acids were tested for their activity in preventing ethylene-induced abscission of leaves from lemon cuttings. The most active of the monochloro compounds was 4-chlorophenoxyacetic acid. Maximum activity was associated with compounds having chlorine in the 2 and 4 positions and hydrogen in the 6 position. An additional chlorine atom in either the 3 or the 5 position had no measureable effect on the activity of 2,4-D. Possible applications in controlling abscission are discussed. [Authors' summary.]—Calif. Citrus Exp. Stat., Riverside.

927. Samygin, G. A.
The effect of maleic hydrazide on the growth and frost resistance of lemon seedlings. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **95**: 411-14, bibl. 4, illus.

Maleic hydrazide applied before and at the start of the second flush in 1·0, 0·5, 0·2 and 0·1% concentrations inhibited the growth of 3-year-old lemon seedlings. There was a positive correlation between the period of induced dormancy and the concentration applied. When some seedlings sprayed with the 1% solution on 10 August were subjected to freezing temperatures at the end of August, and others about 7 weeks later, it was found that the treatment had not increased frost resistance appreciably.

Citrus—pollination.

928. Soost, R. K., and Cameron, J. W.
Production of hybrids by the use of stored trifoliate orange pollen.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 234-8, bibl. 6.

Hybrid seedlings were obtained with pollen of the trifoliate orange, *Poncirus trifoliata* (Linn.) Raf., which had been stored at 4° C. over calcium chloride for various numbers of days and applied to several seed parents. The maximum storage period was 61 days, but viable seeds were not obtained from pollen stored longer than 36 days. Fruits produced with pollen stored 36 days or less had normal seed-set and a normal percentage of seed germination, except when *Citrus ichangensis* was the seed parent. The percentage of hybrid seedlings obtained with each seed parent is reported. [Authors' summary.]—Calif. Citrus exp. Stat., Riverside.

929. El-Tomi, A. L.
Effect of cross pollination on fruit setting in Washington Navel orange.
Citrus Ind., 1954, **35** (8): 5-6, bibl. 4.

In Egypt, a preliminary study was made of the influence on set of Washington Navel oranges using pollen from 12 different parents. Only shaddock gave a significantly greater fruit set than the controls. Further tests with pollen from sukkari orange, common orange, sour orange, sweet lemon, grapefruit and shaddock also showed no significant differences in fruit set between pollen parents or the controls.—Coll. Agric., Shebin El-Kom, Egypt.

Citrus—frost effects.

(*See also* 985s.)

930. Cooper, W. C., Gorton, B. S., and Tayloe, S. D.
Freezing tests with small trees and detached leaves of grapefruit.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 167-72, bibl. 5.

Cold injury of whole grapefruit trees was compared with that of detached leaves from the same tree in an attempt to compare the 2 methods of testing the low temperature resistance of trees. A freezing compartment was constructed to permit the exposure of a whole tree to controlled low temperatures ranging between 20° and 30° F. The trees used in the tests were 2-year-old Webb Red Blush grapefruit trees on sour orange and Cleopatra mandarin rootstocks. Increased injury to the trees resulted from lowering the minimum temperature and from increasing the period of exposure. There was no difference in the resistance to cold injury of trees on the 2 rootstocks, but trees on both rootstocks showed more injury in February and March than in January. Leaves detached from the tree and placed in test tubes showed less freezing injury than leaves on the tree exposed to the same temperature. Supercooling of the leaves in the test tubes is discussed as a possible factor of injury in these tests.—U.S. Dep. Agric. and Tex. agric. Exp. Stat.

931. Klotz, L. J., and DeWolfe, T. A.
Newly described rind blemish of grapefruit.
Calif. Citrogr., 1954, **40**: 44, illus.

The rind injury is formed of many small pits which coalesce to make larger pits. A green halo surrounding the pits may persist after the fruit has matured. The injury is thought to be caused by freezing of dew or rain on the rind.

932. Brooks, F. A., Rhoades, D. G., and Leonard, A. S.
Wind machine tests in citrus.
Calif. Agric., 1954, **8** (8): 8-10, illus.

Four machines each using 70 b.h.p. to give a thrust of 830 lb. were tested in a 40-acre mature citrus grove. It was shown that the 2 machines which first received the cold air-drift acted almost independently, but the pair further downdrift affected each other strongly and maintained an air belt between them of more than 3° F. rise. When the thrust was reduced to 300 lb., corresponding to 19 b.h.p., the effect was lessened, but the 2 downdrift machines were still positively affected by the first 2 machines.

Citrus—diseases and pests.

(*See also* 274, 985c, h, i, o, p, 991, 1139.)

933. DuCharme, E. P., and Knorr, L. C.
Vascular pits and pegs associated with diseases in citrus.
Plant Dis. Reptr, 1954, **38**: 127-42, bibl. 14, illus.

Observations on varietal susceptibility to wood-pitting troubles under Argentine conditions. Their incidence is tabulated for different named citrus scions on different named rootstocks. Clear illustrations show conoid pit, channelling, deltoid pit, fluting and honeycombing and false stem pitting, and the phenomena are discussed with reference to the experience of the authors and other workers elsewhere.—Citrus Exp. Stat., Lake Alfred, Fla.

934. Olson, E. O.
Some bark and bud union disorders of mandarin and mandarin-hybrid rootstocks in Texas citrus plantings.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 131-6, bibl. 14.

Citrus varieties known to be tolerant to tristeza were tested for adaptability to Texas conditions. The author summarizes his results as follows: Of 21 varieties of mandarin and mandarin-hybrid rootstocks budded to Webb Red Blush grapefruit in 1947, 1 or more trees of 14 varieties showed symptoms of cachexia, a bud-transmitted disorder characterized by stem pitting and gum impregnation of the inner phloem of susceptible rootstocks. One or more trees of 11 additional varieties of mandarin and mandarin-hybrid rootstocks and seedlings showed cachexia symptoms in 2 field plantings of Shary Red grapefruit and Valencia orange. Of a total of 25 cachexia-susceptible varieties, 12 varieties of rootstock are reported as susceptible for the first time; they are Choa Chou Tien Chieh, Dancy, Sanguinea, Satsuma and Willowleaf mandarins; Altoona and 4 unnamed tangelos; Kusaie and Rangpur mandarin-limes. A disorder of unidentified cause also occurred [at the bud union] on calamondin rootstock. Tristeza was apparently absent from these plantings. Unless budwood free of the causal agent of cachexia can be found or produced, many mandarin and mandarin-hybrid rootstocks appear unsuitable for Texas.—U.S. Dep. Agric., Weslaco, Texas.

935. Knorr, L. C., DuCharme, E. P., and Busby, J. N.
Discovery of exocortis in Florida citrus.
Plant Dis. Reptr, 1954, **38**: 12-13, bibl. 4, illus.

Poncirus trifoliata has many advantages as a rootstock for citrus, since it induces fruits of high quality, is highly resistant to cold, nematodes, foot rot and water damage and finally is immune or tolerant to tristeza. In the last few years, however, scaling of trifoliate butts by exocortis has been reported from various parts of Florida when trifoliate has been used as a stock for sweet orange, navel orange and grapefruit trees. It has not occurred in stocks worked to Satsuma. This experience of growers suggests that in Florida trifoliate should not be adopted as a stock except on a limited or experimental basis until more is known of the occurrence of exocortis in the citrus varieties of Florida.—Citrus Exp. Stat., Lake Alfred.

936. Olson, E. O., and McDonald, J. R.
Tristeza in Satsuma varieties in Texas.
Plant Dis. Reptr, 1954, **38**: 439-42, bibl. 22.

In this article is reported the occurrence of tristeza virus in 17 Satsuma varieties and Meyer lemon tops grown on trifoliate-orange or other rootstocks in a variety collection near Winter Haven, Texas. The findings are discussed. [See also *H.A.*, 24: 3052.]

937. (Calavan, E. C., Wallace, J. M., and Weathers, L. G.)
Lemon tree decline linked to virus.
Calif. Citrogr., 1954, **39**: 413.

Nucellar Eureka lemon trees were grafted onto sweet orange, sour orange and grapefruit, and inoculated with buds from lemon trees with decline. After 6 years the inoculated trees showed significant growth retardation compared with uninoculated trees.

938. Klotz, L. J.
Dry root rot of citrus.
Calif. Citrogr., 1954, **39**: 340.

Dry root rot is generally related to excess moisture and poor aeration, although the exact cause is unknown. The disease is characterized by a moist decay of the bark in the early stages, which later dries out and dies; leaves may wilt and drop. In early stages the diseased bark and wood may be cut out, and the area disinfected with mercuric cyanide or mercuric chloride. In advanced stages the tree should be removed.

939. Singh, R. S., and Sinha, R. P.
The fruit drop in grape fruit (*Citrus paradisi*) due to *Colletotrichum gloeosporioides.*
Sci. and Cult., 1954, **20**: 41-3, bibl. 6, illus.

Three distinct types of fruit drop due to *Colletotrichum gloeosporioides* have been observed in grapefruit at Kanpur between July and January in recent years. In no case has there been any injury to the stem end tissues. Fruits dropping in July/August show a reddish or reddish-brown stain on the rind, those dropping in September/October show no external abnormality whatever, and those dropping during the winter commonly show "anthracnose hard spot". An investigation of the causative fungus is described. In preliminary experiments spraying the fruit with fungicides considerably reduced the drop.—Govt agric. Coll., Kanpur.

940. Srivastava, H. C., and Singh, B.
Seedling troubles in citrus beds and their control.
Sci. and Cult., 1954, **20**: 93-5, bibl. 6, illus.

Damping-off of grapefruit seedlings due to *Rhizoctonia* *solani* and *Pythium debaryanum* was effectively controlled, without adversely affecting germination, by applying formaldehyde dust at 30 or 40 g. per sq. ft. Formaldehyde at 20 g. and three concentrations of mercuric chloride solution were less effective.—Govt agric. Coll., Kanpur.

941. Gerhardt, P. D.
Argentine ant control with sprays and bait in two California lemon groves.
J. econ. Ent., 1954, **47**: 591-3, bibl. 5.

One application of a spray containing 2 lb. of chlordane, dieldrin or heptachlor per 100 gal. applied at 1·5 to 3 gal. per tree, controlled Argentine ants, *Iridomyrmex humilis*, on lemons for at least 6 months. Of the 3 materials used dieldrin was the best. Poison-bait cups placed beneath infested trees gave less satisfactory results and their maintenance was too laborious. [For earlier trials see *H.A.*, 24: 4228.]

942. Venezuela Ministry of Agriculture.
El bachaco y métodos de combatirlo. **(The bachaco ant and its control.)**
Agric. venezol., 1954, **19** (169): 12-15.

The leaf-cutting ants, *Atta sexdens* and *Aeromyrmex* spp. cause considerable damage to ornamentals and to economic plants including citrus in Venezuela. Notes are given on these ants and their control by chlordane.

943. Stofberg, F. J.
False codling moth of citrus.
Fmg S. Afr., 1954, **29**: 273-6, 294, illus.

The life-history of the false codling moth of citrus (*Argyroploce leucotreta*) is described. Studies at Nelspruit have shown that both Navel and Valencia oranges may be attacked, the average infestation being about 5% and 2% respectively. Other host plants are not important as the moth will breed successfully on mixed Navel and Valencia orchards throughout the year. Sanitation experiments, in which all fallen fruits were collected and destroyed, showed that in blocks where this was done infestation was reduced to about half that of control blocks. The total fruit loss in control blocks was also about twice that in cleaned blocks; thus, although the average loss from false codling moth was only about 10–30% of this total, sanitation was shown to be an important cultural practice. Parathion was the only spray material used which gave significant results, but these were not economic.

944. Rivnay, E.
The Mediterranean fruit fly, *Ceratitis capitata* Wied. Studies on its toxicants, mass migration and control in Israel.
*Ktavim**, 1954, **4**: 3-38, bibl. 27.

Under Israeli conditions methoxychlor, DDT and BHC, in that order, used as wettable powders, were found to give the most satisfactory persistent control of the Mediterranean fruit fly; concentrations of 0·5–1% gave adequate control in the field. Spraying at short intervals with a low concentration could not be replaced by high concentrations applied at longer intervals. The optimal time for spraying summer fruits depended on the time orchards were invaded by the pest, and for apricots was about 10 days before picking. Frequency of applications on summer fruit depended on the speed of ripening of the fruit, as the sprays remain toxic for about 1 week; apricots needed 2 applications and peaches and persimmons 3 or 4 applications. One application of insecticide in early to mid-October gave satisfactory control on Jaffa oranges. On late maturing Valencias the fly was more difficult to control, as fruit ripening and fly population build-up occurred simultaneously, in the rainy season. Population counts in citrus groves showed that there were 2 peak periods, the greatest during May and June, and a second during late September and October. Studies on migration were not successful, but there was some evidence that in the heat of summer the flies sought shade, regardless of the availability of fruit.

945. Jeppson, L. R., Jesser, M. J., and Complin, J. O.
Seasonal weather influence on efficiency of Systox applications for control of mites on lemons in Southern California.
J. econ. Ent., 1954, **47**: 520-5, bibl. 5.

Seasonal influences on efficiency of spray, trunk, and soil applications of Systox against citrus red mite, *Metatetranychus citri* (McG.), and citrus bud mite, *Aceria sheldoni* (Ewing), on lemon trees are reported. All soil applications and winter trunk treatments were relatively inefficient against these pests. The toxicity of spray applications of Systox to citrus red mite persisted for a longer period when applied during winter months than during summer months. Summer trunk treatments resulted in a longer period of toxicity after treatment and more effective reduction of citrus bud mite populations than sprays applied concurrently. Reasons for variation in effectiveness of trunk and spray applications with the seasons are discussed. [Authors' summary]—Calif. Citrus Exp. Stat., Riverside.

946. Knorr, L. C., and Thompson, W. L.
Spraying trials for the control of Florida scaly bark in citrus.
Plant Dis. Reptr, 1954, **38**: 143-6, bibl. 4.

Recent work indicates that Florida scaly bark (syn. nailhead rust, leprosis) is actually due to the feeding of *Brevipalpus* mites. Trials with various materials in 1950 indicate that it can be economically, thoroughly and safely controlled by a single yearly spraying with wettable sulphur, 10 lb. per gal. water, applied just before the spring growth flush.—Citrus Exp. Stat., Lake Alfred.

947. Seki, M.
Studies on the effectiveness and utilization of systemic insecticides upon the injurious insects of citrus trees. I. Control of citrus red mite by soil and foliage applications.
[Japanese, with English summary ⅓ p.]
J. hort. Ass. Japan, 1954, **23**: 57-64, bibl. 13, illus.

In pot and field experiments with young plants soil and foliage applications of Pestox 3 or Systox both gave good control of citrus red mite (*Metatetranychus citri*) while sodium selenate had little effect. The residual effects of soil-applied Pestox and soil-applied Systox lasted at least 3 months and 11–12 weeks respectively. Those of the foliage applications lasted at least 6 weeks in both cases. Pestox was non-toxic and Systox highly toxic to the 7-spotted ladybird, *Coccinella septempunctata bnuckii*.

---

* English edition.

948. SPENCER, H., OSBURN, M. R., AND NORMAN, P. A.
Effect of ground and spray applications of zinc compounds on infestations of purple scales.
Citrus Mag., 1954, **17** (2): 25, 31, bibl. 3.

The effect of zinc nutritional sprays on purple scale populations (*Lepidosaphes beckii*) was studied over 5 years on young orange trees in Florida. In 3 years significantly higher counts of purple scale over control counts were obtained after using a zinc sulphate-hydrated lime spray. Increases in counts after using zinc oxide or zinc carbonate were slight and not significant. Ground applications of zinc salts did not affect infestations as compared with the controls.

949. BAINES, R. C.
Steps forward in citrus nematode research.
Calif. Citrogr., 1954, **39**: 299-300.

It has been estimated that the citrus nematode occurs in at least 95% of the citrus acreage in California. The pests weaken the trees reducing both vegetative growth and yields. Soil fumigation with DD, 2 or 3 months before planting, has given the best control. A breeding programme with trifoliate orange is aimed at producing nematode resistant seedlings.

950. CAMERON, J. W., BAINES, R. C., AND CLARKE, O. F.
Resistance of hybrid seedlings of the trifoliate orange to infestation by the citrus nematode.
Phytopathology, 1954, **44**: 456-8, bibl. 6.
Nematode resistance of trifoliate hybrid seedlings.
Calif. Citrogr., 1954, **39**: 406-7, bibl. 4, illus.
Resistance of hybrid trifoliate orange seedlings to nematode infestation.
Citrus Leaves, 1954, **34** (9): 6-7, 31, bibl. 4, illus.

Previous studies have shown that the common species of *Citrus* are susceptible to the citrus nematode, *Tylenchulus semipenetrans* Cobb, whereas the trifoliate orange, *Poncirus trifoliata* (Linn.) Raf., is markedly resistant. In the present study, young seedling populations of *Poncirus* from 3 sources all showed a high degree of nematode resistance. Hybrid seedling populations were obtained from crosses between *Poncirus* and 5 *Citrus* species. These populations likewise all showed marked resistance, whereas accompanying nucellar seedlings of *Citrus* were usually susceptible. Orchard trees of several older hybrids between *Poncirus* and *Citrus* have shown moderate or severe infestation by the nematode. This may reflect differences in genetic composition or a lessening of resistance in older trees. [Authors' summary to first paper.]—Calif. Citrus Exp. Stat., Riverside.

Citrus—harvesting, packing and storage.

(*See also* 985 l, r.)

951. JONES, W. W., AND CREE, C. B.
Valencia orange production influenced by time of harvest.
Calif. Citrogr., 1954, **40**: 3, 34-5, bibl. 6.

Results are presented of an experiment with Valencia oranges on the effects of early, midseason and late harvesting, over 14 years. The data indicate that a consistent delay of harvest several weeks beyond legal fruit maturity resulted in a reduced fruit yield and grade. Maximum fruit size was obtained by consistent harvesting in midseason. Late harvesting increased the tendency to alternate bearing.

952. INOUE, S., AND KOTO, M.
Investigations on the storage qualities of Satsuma oranges harvested at different dates. [Japanese, with English summary ⅓ p.]
Bull. hort. Sect. Kanagawa agric. Exp. Stat., 1953, No. 1, pp. 40-4, bibl. 7.

Satsuma oranges of the Owari variety were harvested on 20 and 30 November and 10 December, 1950. At the end of the storage period on 19 April, 1951, it was found that (1) weight losses were proportional to the storage period; (2) spoilage losses were 37, 17 and 20% respectively; (3) fruit colour and calyx condition were best in the 2nd lot followed by the 3rd and 1st in that order.

953. EAKS, I. L.
Rate of heat exchange of lemons and oranges packed in standard boxes and in half-box fiberboard cartons.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 279-84, bibl. 3.

Experiments are reported in which relative rates of heat exchange of lemons and oranges packed in standard boxes and in vented and unvented half-box fiberboard cartons were determined, free air circulation being maintained around each container. In general, the rates of heat exchange were similar for both lemons and oranges and for fruits at the top of all containers. The rate of heat exchange was faster (significant at the 1% level) for fruits in the center of the carton than for those in the center of the standard box. The rate of warming was more rapid than the rate of cooling for fruit in the top of all containers, but not, as a rule, for fruit in the center of the containers. Differences in the rate of heat exchange between fruits in the center and outside positions in the standard box were highly significant, whereas in the cartons these differences were small. Venting of the cartons had little or no effect upon the rate of heat exchange in these tests. It is concluded that the desired refrigeration of rail shipments of lemons and oranges in cartons could be obtained by providing air circulation around the cartons. [Author's summary.]—Calif. Citrus Exp. Stat., Riverside.

954. DES GARETS, O.
Le transport des agrumes en cadres (ou containers). (**Transporting citrus in bulk containers.**)
Fruits et Prim., 1954, **24**: 253-5.

During the last 3 years the transport of North African citrus in bulk containers has brought great economies in packing, transport and handling and has simplified and accelerated distribution on arrival at destination. Fruit is packed either in open trays, or in 2-kg. net bags in very light, lidless 10-bag containers called stabilis, 108 of which go into a 7 cu.m. bulk container, or it can be placed loose in the stabilis.

955. Harding, P. L.
Effects of simulated transit and marketing periods on quality of Florida oranges.
Citrus Mag., 1954, **17** (2): 26-7, 32, bibl. 9.

Tests on Pineapple and Valencia oranges showed that only a very small amount of ascorbic acid was lost when the fruit was held for 3 or 6 days at 50° F. or 7 days at 70° F. There was no consistent change in total solids, but total acid decreased during a 10 to 13-day period.

956. Fujita, K., Inoue, S., and Koto, M.
Effect of temperature and humidity on the storage life of Satsuma oranges (1) Experiments on different storage methods. I.
Fujita, K., Mukasa, S., and Koto, M.
Ibid. II. [Japanese, with English summaries 7 and 12 lines.]
Bull. hort. Sect. [or *Branch*] *Kanagawa agric. Exp. Stat.*, 1953, No. 1, pp. 51-6, bibl. 13, illus., and 1954, No. 2, pp. 8-11, bibl. 9.

Storage at 5° C. and 85% humidity gave the lowest weight loss, the lowest rate of rotting, the least change in specific gravity and the least calyx discoloration in storage, but colour development was not good.

957. Munger, F., and Broadbent, B. M.
2,4-D prolongs life of experimental lemons on the Henderson rearing racks.
J. econ. Ent., 1954, **47**: 715, bibl. 3.

The Henderson rearing rack is used for holding lemons in laboratory spray experiments against California red scale, *Aonidiella aurantii*. By dipping lemons for 2 min. in a 2,4-D-salt solution of 1:1,600 concentration their average life was prolonged from 170 to 258 days. The 2,4-D treatment did not affect the use of the fruit as hosts.

958. Cuillé, J., and Yvon, A.
Influence de traitements chimiques sur la conservation des agrumes. **(Effect of chemical treatments on the storage life of citrus.)**
Fruits d'Outre Mer, 1954, **9**: 314-18, bibl. 6.

In experiments on the control of *Penicillium* rots and desiccation North African citrus fruits were dipped in a boron salt (generally Pentabor, $5\ B_2O_3\text{-}Na_2O,10H_2O$) and/or sprayed with wax emulsion before despatch to the Paris market. Pentabor alone gave good protection in transit, reducing losses through rot by about 50%, but if the fruit was held in stock for more than a week after arrival treatment became necessary and at this stage boron was less efficacious. Wax alone considerably reduced losses through desiccation. Treatment with boron and wax together gave good results and is recommended. A plea is made for the more careful handling and stowage of citrus boxes and for the fumigation of holds and warehouses with fungicidal or fungistatic aerosols. [See also *H.A.*, 23: 2199 and 24: 1886.]

959. (Hopkins, E. F., and Loucks, K. W.)
New treatment greatly reduces citrus fruit decay.
Atlantic Coast Line agric. Livestk Topics, reprinted in *Citrus Mag.*, 1954, **17** (2): 30.

Promising results have been given in the control of decay in oranges by a combination of 2% Dowicide A and 1% hexamine. The fruits are dipped into a water solution of these chemicals for 2 minutes at 90° F., and then rinsed in clear water.

960. Newhall, W. F., Elvin, E. J., and Knodel, L. R.
Infrared determination of biphenyl in citrus fruits.
Analyt. Chem., 1954, **26**: 1234-6, bibl. 4.

A quantitative analytical method has been devised to estimate the biphenyl residue in peel or juice of citrus fruits packed in cartons impregnated with fungistatic materials containing biphenyl. A direct determination of the biphenyl was obtained by recording the infrared absorption of samples of orange oil, obtained by the steam distillation of minced peel or juice.

961. Kirchner, J. G., Miller, J. M., and Rice, R. G.
Quantitative determination of biphenyl in citrus fruits and fruit products by means of chromatostrips.
J. agric. Food Chem., 1954, **2**: 1031-3, bibl. 10.

A chromatographic procedure has been developed for separating the biphenyl from interfering citrus oils. Two quantitative methods of measuring the amount of biphenyl on the strips are presented. These methods are well suited to determine the amounts of biphenyl absorbed by citrus fruits during storage in a biphenyl atmosphere and amounts occurring in processed citrus products. [From authors' abstract.]

Dates.

(*See also* 985v.)

962. Anon.
Palmier-dattier. **(Date palm.)**
Rapp. Cons. Exp. Rech. agron. Algér. 1953, 1954, pp. 199-200.

Pollen studies at El-Arfiane have shown that growers should select male plants for quality as well as for quantity. Tests at Aïn-Ben-Noui showed that fertilization of each opening flower was not necessary, and excellent fertilization resulted from dusting pollen into the centre of the palm.

963. Smirnoff, W.-A.
La cochenille parasite du palmier-dattier en Afrique du Nord. **(The scale pest of date palms in North Africa.)**
Trav. orig. Serv. Déf. Végét., **4**, 1954, pp. 42, bibl. 23, illus.
Travaux réalisés au Maroc sur *Parlatoria blanchardi*, cochinelle du dattier. **(Research in Morocco on the date scale, *Parlatoria blanchardi*.)**
Terre maroc., 1954, **28**: 244-6.

The biology and ecology of *Parlatoria blanchardi* have been studied in Morocco since 1951. All aerial parts of the date palm are attacked, the infestation usually starting in shaded, sheltered parts at the base of the pinnules and fronds. Heavy infestations of the pest inhibit normal plant development, causing premature drying-up of the fronds, and may even kill young palms. The scale is a xerophil, but prefers a micro-climate with

a relatively high humidity, and palms in the centre of an oasis have a higher rate of infestation than those exposed to the drying winds. In this region *Parlatoria* has a maximum of 4 generations in a year, although 3 are more usual. The majority of the females were found on young fronds, and of males on old fronds. Biological control of the scale is the only remedy possible under local conditions, hence the attention paid to the annual life cycle.
The second paper also refers to biological control and describes measures needed for its successful application. [See also note, 985v, and *H.A.*, 23: 1193.]

Feijoas.

(*See also* 985h.)

964. HARRINGTON, F. B.
Delicate-flavoured feijoa resists Highveld frosts.
Fmr's Wkly, S. Afr., January 13, 1954, p. 46, illus.

Feijoa, *F. sellowiana*, is propagated by seed, cuttings, layers or grafting. Marcotting with the aid of plastics has not proved successful. Birds as well as bees appear to effect cross-pollination. Bearing trees on the South African Highveld withstood the recent cold winter without injury. Feijoa is free from diseases and its only major pest is fruit fly, for the control of which ½ oz. of lindane and 1½ lb. of brown sugar in 2 gals. of water applied at weekly intervals gave good results.

Litchis.

965. LIU, S.-Y.
Studies of *Litchi chinensis* Sonn.
Diss. Abstr., 1954, **14**: 1018-19, being *Publ.* 8332 of 274 pp.

Litchi chinensis is an example of a complex of types probably derived by cultivation from more than one wild progenitor, but now so intermingled that the geographical distribution of distinguishable varieties cannot be determined. The horticultural varieties successfully introduced into Florida represent the main variations occurring in China and are mostly clones, some of which give seedlings conforming in general to the parent tree type. The type named *Litchi chinensis* probably belongs to one of the horticultural varieties which as a group are clearly distinct from the "Mountain Lychee" variety. There are 3 types of flower, staminate, pistillate and imperfectly hermaphrodite, which appear consecutively on the same panicle, in 2 sequences. The change-over from one flower type to another may occur suddenly during the intermission period in some varieties, while in others there is an overlapping period of some days. Root-tip smears from seedlings and air-layered plants showed that the haploid chromosome number was 14, 15, 16, or rarely even 17. The highest percentage drop of young fruit occurred during the first month after setting; such a drop may be attributed partly to nutritional factors and partly to failure in fertilization, to embryo malformation and to embryo abortion. The last phenomenon may possibly be caused by lethal unbalance resulting from pollination by square pollen grains, which are probably abnormal cytogenetically. It is suggested that they may be diploid, and that seeds with triploid embryos drop. Other subjects covered by the thesis include variation in the number and distribution of stomata, the possible commercial utilization of the ability of the litchi to produce parthenocarpic fruit and the developmental morphology of the fruit.

966. DEKLE, G. W.
Insects on lychee.
Citrus Ind., 1954, **35** (8): 4.

A list has been compiled from Florida State records of insects which have been found on litchi, some of which may become of economic importance with increased acreages.

Macadamias.

967. HAMILTON, R. A., AND STOREY, W. B.
Planting a new macadamia orchard.
Hawaii Fm Sci., 1954, **3** (1): 6, 8, illus.

Points discussed include the desirability of using good grafted nursery stock rather than seedlings, the need to root-prune young trees 2½ to 4 months before transplanting, spacing in the orchard of not less than 30×30 ft. or 18×18 ft. to 20×20 ft. if fillers are planted, and the best season and methods for transplanting.

968. URATA, U.
Pollination requirements of macadamia.
Tech. Bull. Hawaii agric. Exp. Stat., **22,** 1954, pp. 40, bibl., illus., from abstr. in *Trop. Abstr.*, 1954, **9**: 644.

A description is given of the floral morphology and behaviour of macadamia, with special reference to pollination. The 4 commercial varieties tested at Waipahu were all found to be mutually cross-compatible. Pollination is predominantly by insects.

Olives.

(*See also* 274, 985b, d, m, t, 1146.)

969. CARRANTE, V., AND DEL GAUDIO, S.
Sull'anulazione dell'olivo. **(On ring-barking olive trees.)** [English summary ½ p.]
Ann. Sper. agrar., 1954, **8**: 1493-1511, bibl. 1.

In a previous experiment [see *H.A.*, 22: 3442] ringing olive branches in June, i.e., after fruit set, did not significantly increase yield. In 1951 branches of trees of 14 varieties were ring-barked in early April, i.e., just before budburst. Except in a few unimportant varieties there was again no significant increase in fruit yield.

970. JACOBONI, N.
La cascola serotina delle olive. **(Late drop of olives.)** [English, French and German summaries 12 lines each.]
Olearia, 1954, **8**: 3-11, bibl. 47, illus.

Experiments made in 1951 and 1952 on controlling late fruit drop in the Dolce Agogia olive variety with Fruitone (sodium salt of 2,4-D) at concentrations ranging from 0·025 to 0·2% were unsuccessful. Studies were made on the point of abscission in immature and mature fruits when these were harvested by knocking down and by hand, or allowed to fall naturally, and on the anatomy of the abscission zone. Conclusions were: (1) the natural abscission layer forms at the point at which the calyx is attached to the pedicel; (2) hormone treatment is ineffectual because (*a*) the lower region of the pedicel is unable to form an abscission layer and thus cannot regulate fruit drop, and (*b*) the fruit cluster is covered with stellate hairs, which largely shield it from the spray.

971. Rui, D., and Bonfante, S.
Il "morbio" dell'olivo nel gardesano. **(Olive leptonecrosis in the province of Garda.)**
Inf. agric., November 1953, No. 45/46, pp. 19-26, from abstr. in *Olearia*, 1954, **8**: 29-30.

Fertilizer experiments showed that the disease is due to boron deficiency.

972. Castellani, E.
Osservazioni e ricerche sull' "occhio di pavone" dell'olivo in Sardegna. II. Infezione ed estivazione. Andamento della malattia in funzione delle variabili climatiche. **(Observations and work on olive leaf spot in Sardinia. II. Infection and summer survival. Progress of the disease in relation to climatic changes.)** [English, French and German summaries 6 to 8 lines each.]
Olearia, 1954, **8**: 56-67, bibl. 11, illus.

Entry and summer survival of the pathogen *Cycloconium oleaginum* and its control by spraying with bordeaux mixture in August–September, October, February and, if necessary, May.

973. Morettini, I.
Ricerche sull'anatomia delle foglie delle piu note varietà di olivo toscane in relazione alla loro resistenza al *Cicloconium oleaginum*. **(Research on the anatomy of the leaves of the better known olive varieties of Tuscany in relation to their resistance to *Cycloconium oleaginum*.)** [English summary 9 lines.]
Not. Mal. Piante, 1954, No. 28, pp. 3-11, bibl. 5, illus.

The varieties studied were the very resistant Leccino, Madonna dell'Impruneta and Leccio del Corno, the moderately resistant Frantoio and Pendolino and the susceptible Moraiolo and Morchiaio. The most resistant varieties have relatively thin palisade tissue.

974. Venezia, M.
Aspetti della lotta contro la mosca olearia. **(Olive fruit fly control.)**
Not. Mal. Piante, 1954, No. 28, pp. 38-44, bibl. few in text.

Conclusions drawn from tests on the control of *Dacus oleae* in Italy in 1953 are that: (1) DDT plus parathion is highly effective against all stages of the fly; (2) parathion emulsion gives good control; (3) the Berlese method, with or without modifications, is an effective and economic method of control up to the beginning of the autumn rains and in areas where harvesting is fairly early; (4) demonstrations of poison bait control, which is only effective when applied over a large area, should be continued, especially in southern Italy, the number of treatments being raised from 6 to 10.

975. Pellegrini, G.
Esperimenti di lotta antidacica svolti nel 1952 con un insetticida a base di p. nitrofenildietiltiofosfato. **(Experiments on the control of *Dacus oleae* with parathion in 1952.)**
[*Publ.*] *Centr. Sper. agr. Soc. Montecatini*, 1954, pp. 90, from abstr. in *Not. Mal. Piante*, 1954, No. 28, p. 91.

Parathion reduced infestation to 0·1–4·3% compared with 14–95% in the controls, being effective against eggs, larvae and adults, but it affected the character of the olive oil, especially its acidity.

976. Avidov, Z., and Mohrer, I.
Occurrence of the olive fly at Huldah in 1953 and its control.
*Ktavim**, 1954, **4**: 51-9, bibl. 6.

Three European olive varieties were used in tests on the control of olive fly [*Dacus oleae*]. Dieldrin showed greater stability and gave better control at equal amounts of active ingredient than did methoxychlor. Two sprays, in mid-June and mid-July, gave satisfactory control on these varieties. [See also *H.A.*, 24: 323]—Agric. Res. Stat., Rehovot.

977. Service de l'Horticulture, Maroc.
Note sur les démonstrations de recolte d'olives effectuées au cours de la campagne 1951–1952. **(Notes on demonstrations of olive harvesting in the season 1951-1952.)**
[*Mimeo.*] *Serv. Hort. Rabat*, undated, pp. 13, illus.

The method generally recommended is an improved version of the traditional "gaulage", using short, flexible sticks and extensive canvasses to catch the fruit, operating from the inside of the tree outwards, and giving the harvesters no right to fallen wood. Hand picking, however, is preferable where the tree form allows it.

978. Vaughn, R. H., and Hartmann, H. T.
Off-flavor in canned olives.
Calif. Agric., 1954, **8** (10): 13-14.

Olives from trees treated 3 months earlier with BHC or lindane, as soil applications, foliage sprays or painted on pruning cuts, developed a mouldy off-flavour when subsequently processed.

Passion fruit.

(*See also* 985k.)

979. Nishida, T.
Entomological problems of the passion fruit.
Hawaii Fm Sci., 1954, **3** (1): 1, 3, 7, illus.

Both beneficial and injurious insects are being studied in Hawaii. Among the former the carpenter bee, *Xylocopa varipunctata*, is believed to be the main pollinating agent. Honey bees, being much smaller, are not effective. Large moths may also pollinate passion fruit. Among the few pests the most important are fruit flies, notably *Dacus dorsalis* and *D. cucurbitae*, followed by the mites *Brevipalpus papayensis* and *Hemitarsonemus latus*. Fruit flies can be controlled by DDT, parathion or malathion and mites by sulphur, but careful timing of fruit fly sprays is necessary if the destruction of carpenter bees is to be avoided.

---

* English edition.

Persimmons.

(*See also* 985u.)

980. Nesterenko, G. A.
The use of persimmon fruits. [Russian.]
Sad i Ogorod, 1954, No. 8, pp. 46-8, illus.

Ripe fruits of persimmon [*Diospyros kaki*] contain 17–18% sugars, mainly in the form of glucose and saccharose. They have a high vitamin C content and are valuable both for fresh consumption and preservation. Varieties are named and methods of harvesting, grading, packing and transport are described. Firm-ripe fruits can be stored for 50–60 days at 1–5° C.

Tung.

981. Merrill, S., Jr., and others.
Relative growth and yield of budded and seedling tung trees for the first seven years in the orchard.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 119-27, bibl. 6.

Seedling and budded progenies of each of 4 to 8 tung mother trees were compared in orchard experiments planted in 1946 in 4 representative locations in the Tung Belt of the southern United States. Shoot measurements made at three locations suggest that budded trees tend to make more growth during the first year in the orchard than do seedlings. In 1952, cross-sectional areas of the trunks of budded trees ranged from 52 to 97% as large as those of corresponding seedlings. The average difference between clonal and seedling trees are supported by exceedingly high values of F. At all 4 locations, average total yields of whole fruit from planting through 1952 were less for budded than for seedling trees. The differences were greatest and attained highest statistical significance under poor culture; under good culture on reasonably favorable soil, the yields of budded trees tended to approach or equal those of seedlings. Seedlings and budded progenies did not differ significantly in yield per unit of cross-sectional trunk area. Hence seedlings attained their higher yields largely or wholly through larger size of tree. Inheritance from the mother tree significantly affected both growth and yield, and there was also a significant interaction of methods of propagation with this "mother-tree effect". In other words, the mother trees varied in relative suitability for propagation by the two methods. The oil content of the fruit varied from year to year and at different locations; in some years fruit of budded trees had higher oil content than those of seedlings and in other years the reverse was true. As an overall average, the oil content of fruit from budded trees did not differ significantly from that of fruit from corresponding seedlings. [Authors' summary.]—U.S. Dep. Agric. and S. Miss. Branch Exp. Stat.

982. Potter, G. F., and others.
Cold injury to young tung trees in northern Louisiana.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 179-81.

The cold resistance of several budded and seedling tung varieties was studied in a location considerably farther north than tung is grown commercially. Cold injury during 2 successively severe winters is recorded. Budded trees made far less satisfactory recovery than seedlings from the same mother tree, and regrowth was more severely injured on the budded trees. There was little if any significant difference between the resistance of the seedlings. It appears difficult to bring tung trees to maturity in northern Louisiana unless a series of favourable winters follows planting.

983. Drosdoff, M., Kilby, W. W., and Potter, G. F.
Response of tung trees to phosphorus and other elements on savannah very fine sandy loam.
Soil Sci., 1954, **78**: 361-6, bibl. 5.

Trees of 5 tung clones, A–4, A–12, F–541, L–9, and M–1, were supplied with low and high levels of P, K, Ca, and Mg after planting until they were 9 years old. The P treatment was outstanding in increasing yields, and the high yields were associated with large increases in leaf P. Added P also increased the leaf content of N, Ca, and Mg, but by the ninth season had reduced leaf K as the increased production of tung fruit caused a drain on the K supply. The 5 clones differed somewhat in their responses to P: clone F–541 showed the greatest proportionate increase in yield and L–9 the greatest absolute increase. K increased average yields of all clones significantly in the sixth and subsequent years. Applied K produced the greatest increase in yield in clones A–12 and L–9. Mg reduced yield of these 2 clones but increased yields of others slightly and thus had no significant all-over effect. Ca had only minor effects on yields of the different clones. [From authors' summary.]

984. Gilbert, S. G., Drosdoff, M., and Sell, H. M.
Differential absorption by tung seedlings of potassium from some of its salts.
Soil Sci., 1954, **78**: 219-24, bibl. 12.

A new technique is described for studying the effects of different anions upon the absorption of a specific cation, potassium, by tung seedlings grown in sand culture. The relative rate of absorption of potassium from salts of 5 anions was determined over a 30-day period. The results show that potassium of the monovalent salts, chloride and nitrate, was accumulated in the leaves of the plants at a significantly higher rate than was that of the polyvalent salts, sulphate, tartrate and pectate. These findings are in accord with theories which relate the absorption of the cation to that of the anion.—U.S. Dep. Agric., Gainesville, Fla.

Noted.

985.

a Anon.
Avocado culture in South Africa.
World Crops, 1954, **6**: 425.
Especially for oil.

b Anon.
Olive farming in South Africa.
World Crops, 1954, **6**: 467, illus.

c Armitage, H. M.
The Mexican fruit fly.
Calif. Citrogr., 1954, **39**: 342, 358-62, illus.
Anastrepha ludens, fruits attacked, life history and control.

d Avidov, Z.
Further investigations on the ecology of the olive fly (*Dacus oleae*, Gmel.) in Israel.
*Ktavim**, 1954, **4**: 39-50, bibl. 5.

e Bringhurst, R. S.
Interspecific hybridization in and chromosome numbers in *Persea*.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 239-42, bibl. 6, illus.

f Chapman, H. D.
Citrus observations in Brazil.
Calif. Citrogr., 1954, **39**: 379, 390-2.
Citrus observations in South America.
Citrus Leaves, 1954, **34** (10): 8-9, 31.
Areas, varieties, rootstocks, etc.

g Chéhab, J.
L'horticulture au Liban. (**Horticulture in the Lebanon.**)
Rev. hort. suisse, 1954, **27**: 288-9.
Market gardening, citrus, bananas and flowers.

h Cressman, A. W., Broadbent, B. M., and Munger, F.
Control of red scale with parathion.
Calif. Citrogr., 1954, **39**: 379, 392-5, bibl. 4.
See *H.A.*, 24: 4235.

i Cressman, A. W., Munger, F., and Broadbent, B. M.
Oil-parathion sprays for red scale on citrus.
Calif. Citrogr., 1954, **39**: 424, 440-1, 444.
See *H.A.*, 24: 4236.

j Fletcher, W. A.
N.Z. citrus fruit industry.
Orchard. N.Z., 1954, **27**: 2-5.

k Fletcher, W. A.
Sub-tropicals in New Zealand.
Orchard. N.Z., 1954, **27**: 25-7.
Tree tomatoes, Chinese gooseberries, passion fruit, and feijoas.

l Fujita, K.
Experiments on the exportation and transportation of early Satsuma oranges. [Japanese, with English summary ¼ p.]
Bull. hort. Sect. Kanagawa agric. Exp. Stat., 1953, No. 1, pp. 1-8.
Fruit shipped to Canada from Japan.

m Graniti, A.
Ricerche sulle anomalie fogliari dell'olivo in Sardegna. I. Studio delle alterazioni indotte da *Eriophyes oleae* Nalepa alle foglie di olivo. (**Research on olive leaf malformations in Sardinia. I. Alterations caused by *Eriophyes oleae*.**) [English summary 7 lines.]
Bol. Staz. Pat. veg. Roma, 1953 (issued 1954), **11**: 117-23, bibl. 7, illus.

n Malan, E. F., and van der Meulen, A.
Avocado culture in South Africa.
Fmg S. Afr., 1954, **29**: 309-15, illus.

o Martin, H.
Observations sur les attaques de la mouche des fruits sur agrumes en Tripolitaine (Lybie) en 1952/53. (**Notes on fruit fly attacks on citrus in Tripolitania (Libya) in 1952/53.**)
Fruits et Prim., 1954, **24**: 256-9.
Factors affecting *Ceratitis capitata* infestation.

p Nasser, A. B.
Notes on some insect pests in Lebanon.
FAO Plant Prot. Bull., 1954, **29**: 138-9.
Especially *Ceratitis capitata* and rust mite (*Phyllocoptruta oleivora*) on citrus.

q Reitz, H. J., and others.
Recommended fertilizers and nutritional sprays for citrus.
Citrus Mag., 1954, **17** (1): 14, 16, 22, 24, and **17** (2): 11-13, 37.
In Florida.

r Rutherford, D. M.
Volume fill Valencia packing.
Calif. Citrogr., 1954, **39**: 287-8, illus.
In 38 lb. cartons.

s Saponaro, A.
Segnalazione sui danni da freddo agli agrumi durante l'inverno 1953-54. (**Frost injuries to citrus in the winter of 1953/54.**) [English summary, 3 lines.]
Bol. Staz. Pat. veg. Roma, 1953 (issued 1954), **11**: 251-60, bibl. 6, illus.
Tree and fruit injuries described.

t Service de l'Horticulture, Maroc.
Catalogue des variétés d'olivier en culture dans les stations régionales horticoles du Maroc. (**List of olive varieties grown in the regional horticultural stations of Morocco.**)
[*Mimeo.*] *Serv. Hort. Rabat*, 1954, pp. 5.

u Skallerup, H. R.
The distribution of *Diospyros virginiana* L.
Ann. Mo bot. Gdn, 1953, **40**: 211-25, bibl. 104, illus.
In the U.S.A.; a review supplemented by observations.

v Smirnoff, W.[-A.].
Les *Pharoscymnus* (*Col. Coccinellidae*) d'Afrique du Nord, prédateurs de *Parlatoria blanchardi* Targ. (***Pharoscymnus* spp. of North Africa, predators of *Parlatoria blanchardi*.**)
Reprinted from *Rev. Path. vég.*, 1953, **32**: 143-60, bibl. 15, illus.
See also abstract 963.

---

* English edition.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 1132u, 1133c, 1141, 1152, 1159, 1164, 1165, 1166, 1171, 1173, 1174, 1176, 1178, 1180, 1181a, b, d, e, j, k, l.)

986. Beckett, W. H.
Crop forecasts and estimates with particular reference to permanent crops in the tropics.
Trop. Agriculture Trin., 1954, **31**: 292-302.

The data required for crop forecasts and estimates are discussed. These fall into 4 groups, namely, crop reporters' statements, meteorological data, observations on the growing crop (a study of the fruit growth curve in observation plots), and statistical investigation (secular trends, crop-weather correlations, production characteristics and economic factors).

987. Mason, R. R.
Agronomical investigations, 1953. Progress notes from the agricultural stations.
Agric. J. Dep. Agric. Fiji, 1953, **24**: 66-7.

Trials in progress at Koronivia and Sigatoka Agricultural Stations during 1953 were: *banana:* clean cultivation *vs.* grass and legume cover crops, liming, NPK, and spacing; *sugar-cane:* rotations.

988. Forsyth, W. G. C., and Simmonds, N. W.
A survey of the anthocyanins of some tropical plants.
Proc. roy. Soc., 1954, **142**: 549-64, bibl. 16.

The anthocyanin pigments of 246 wild and cultivated plants grown in Trinidad, B.W.I., were surveyed by paper chromatographic methods. The complexity of glycosidic combination appears to be much greater than has hitherto been supposed. The hypothesis that there is a high frequency of pelargonidin among tropical plants has not been confirmed. [From authors' summary.]

989. Stehlé, H.
Quelques notes sur la botanique et l'écologie végétale de l'Archipel Caraïbes. **(Some notes on the botany and ecology of the Caribbean Archipelago.)**
J. Agric. trop. Bot. appl., 1954, **1**: 71-110.

This paper includes sections on the recognition of the fungal diseases of banana plants, banana fruits, coffee and sugar cane, and of the virus and deficiency diseases of sugar cane and banana plants in the French West Indies. Brief mention is also made of the bacterial diseases of sugar cane, banana, tobacco, solanaceous vegetables, vanilla and castor found in the area.

990. Puttarudriah, M.
Recent entomological investigations and developments in plant protection.
Mysore agric. Calendar, 1954, 1954, pp. 51-5.

The following are among the pests mentioned: *Helopeltis antonii* causing guava blister disease was controlled by dusting the trees with gammexane D.025. The tamarind seed borer, *Sitophilus linearis*, was controlled by fumigation for 72 hours, using Killoptera at a rate of 30 lb. per 1,000 cu. ft. Two sprays of 50% DDT wettable powder, one before flowering and another 6 weeks later, gave satisfactory control of mango hoppers. *Pyrilla*, which has recently been found on sugar cane in Mysore, was satisfactorily controlled by DDT 50% wettable powder or gammexane D.025. A poison bait of sodium silicofluoride, bran and jaggery was effective in controlling cutworms on vegetables.

991. Vilardebo, A.
La lutte contre *Zonocerus variegatus*. Campagne de lutte 1953-1954. Application des traitements par nébulisation. **(Control of *Zonocerus variegatus* in the 1953/54 season. Treatment by fogging.)**
Fruits d'Outre Mer, 1954, **9**: 302-10, bibl. 1, illus.

An account is given of further experiments in which successful control of the cricket *Zonocerus variegatus* was obtained at the I.F.A.C. Central Station in French Guinea by fogging with insecticide in oil or spraying with insecticide in water. BHC was used in citrus and bananas and chlordane in pineapples. [See also *H.A.*, 24: 1919.]

992. South Pacific Commission.
Grading of fresh fruit exports from South Pacific Territories.
Tech. Pap. S. Pacific Commiss., **55**, 1954, pp. 14.

Details are given of exports from South Pacific territories of bananas, citrus, pineapples, tomatoes and melons. Varieties are listed and regulations defining export quality standards and packing containers are outlined.

Bananas.

(*See also* 985g, 987, 989, 991, 992, 1132s, 1133n.

993. Moity, M.
La carence en zinc sur le bananier. **(Zinc deficiency in the banana plant.)**
Fruits d'Outre Mer, 1954, **9**: 354.

The symptoms of zinc deficiency observed in banana plants which had been treated with magnesian limestone to control Mg deficiency were: stunting, bunchy foliage, leaf deformity including size reduction, increased length/breadth ratio and termination in a point, and leaf discoloration, the leaves being either entirely white or white towards the base with the rest of the blade showing discoloured transverse stripes alternating with greener bands, and the chlorotic parts showing numerous small, oblong, lighter patches which ultimately rotted. Cure was effected by watering each plant with a solution containing 25 g. unneutralized zinc sulphate.

994. Simmonds, N. W.
Anthocyanins in bananas.
Ann. Bot. Lond., 1954, **18**: 471-82, bibl. 15.

The bracts of wild banana species are pigmented by glycosides of 4 combinations of anthocyanidins. The bracts of edible bananas have, broadly, the pigments expected on taxonomic and genetic grounds but show a tendency towards a generally lower level of methylation of the anthocyanidins. Leucoanthocyanins are present in most parts of the banana plant; they yield delphinidin and cyanidin in proportions that vary approximately with overall intensity. [From author's abstract.]

995. Cuillé, J., and Guyot, H.
Les traitements fongicides des bananeraies. Utilisation des appareils de traitements en bananeraie. **(Apparatus for the fungicidal treatment of banana plantations.)**
Fruits d'Outre Mer, 1954, **9**: 269-88, bibl. 13, illus.

After a discussion of the theoretical considerations governing the fungicidal control of *Cercospora* leaf spot in banana plantations an account is given of tests made at the I.F.A.C. Antilles Station with different types of apparatus for coarse and fine spraying, dusting and fogging, together with notes on the effectiveness and cost of the different treatments. Fogging and low-volume fine spraying (40–60 l./ha., average particle size 65–80 microns) with fungicide-oil mixtures were both efficacious, but the latter is preferred under moist tropical conditions.

996. Guyot, H., and Cuillé, J.
Les formules fongicides huileuses pour le traitement des bananeraies. **(Fungicide-oil formulations for the treatment of banana plantations.)**
Fruits d'Outre Mer, 1954, **9**: 289-92, bibl. 6, illus.

Oil formulations are necessary for low-volume spraying in the tropics, since water at the requisite particle size evaporates before reaching its objective. In tests on the control of *Cercospora* leaf spot at the I.F.A.C. Antilles Station each of the following formulations was effective at 40 l./ha.: (1) 20 l. oil, 14 l. gas-oil, 9 kg. 50% copper oxychloride; (2) 20 l. oil, 20 l. gas-oil, 4 kg. 65% zineb. The degree of phytotoxicity shown by the mineral oils is too slight to constitute a drawback. They are more effective and cheaper than ordinary sprays.

997. Guyot, H.
La lutte contre *Cercospora musae* dans les bananeraies de Guadeloupe. Essais de nébulisation (fogging). **(Control of *Cercospora musae* in the banana plantations of Guadeloupe. Fogging tests.)**
Fruits d'Outre Mer, 1954, **9**: 293-6, bibl. 1, illus.

A further account is given of the experiment described in *H.A.*, 24: 1924. Treatment unavoidably ceased in October 1953 and the treated plants were quickly attacked by *Cercospora*. By February, 1954, they were as severely affected as the untreated plants, but their suckers were more vigorous. In the 3 months after treatment had ceased the yield of exportable bananas from the zineb plot was 4·7 tons per ha., 4 times that of the untreated plot. In another experiment on bananas which were planted in August, 1953 and became infected in November two fogging treatments (November and December) with a suspension of zineb in oil were more effective than conventional sprays of zineb plus copper oxychloride applied fortnightly from November to February.

998. Merny, G.
Essai de nébulisation et de pulvérisation pneumatique dans la lutte contre *Cercospora musae* à la Guadeloupe. **(Tests on the control of *Cercospora musae* in Guadeloupe by fogging and mist blowing.)**
Fruits d'Outre Mer, 1954, **9**: 297-301, illus.

The range of a mist blower and a fogging apparatus with and against the wind were compared in a banana plantation at Capesterre, observations being made at 10 m. intervals. The mist blower was effective for 10 m. in both directions. The fogging apparatus was effective for 10 m. with, but not against, the wind.

999. Merny, M.
Recherche d'une technique de micro-essais de produits fongicides contre *Cercospora musae* à la Guadeloupe. **(Investigation of a micro-test technique for fungicides used against *Cercospora musae* in Guadeloupe.)**
J. Agric. trop. Bot. appl., 1954, **1** (1/4): 61-70, illus.

Four circles, 16-cm. in diameter, are marked on the righthand side of the back of a newly-opened banana leaf. The materials to be tested are applied to 2 of these, the standard fungicide, 50% copper oxychloride, is applied to the third and the fourth is the control. Counts of the number of infection spots in each circle begin a month after treatment and end 2 weeks later. Tests made with a number of fungicides have shown zineb to be superior to copper oxychloride. The imperfections of the method and recommended improvements are discussed.

1000. Brun, J.
La pourriture des bananes au Cameroun français. **(Banana rot in the French Cameroons.)**
Fruits d'Outre Mer, 1954, **9**: 311-13, bibl. 1, illus.

This is the first of a series of papers on a serious rot of Gros Michel bananas which affects the whole fruit. The chief fungus present is generally *Trachysphaera fructigena* but *Stachylidium theobromae*, the agent of cigar-end rot in dwarf bananas, is sometimes present. Notes are given on the geographical distribution of the rot in the French Cameroons, its incidence from year to year, and environmental factors favouring it, namely, high rainfall, high altitude, and proximity to forest and native crops. Suggested control measures based on incomplete knowledge are: (1) ensure minimum fruit production during the danger period from mid-June to mid-September by pruning in June to leave only stems carrying fruit and suckers which will not flower until October; (2) control suckering to ensure maximum flower production in June/September; and (3) apply fungicides.

1001. Akamine, E. K., Arisumi, T., and Nakayama, M.
Tolerance of Chinese bananas to ethylene dibromide.
Hawaii Fm Sci., 1954, **3** (1): 2-3, illus.

The approved treatment against oriental fruit fly for Chinese bananas shipped from Hawaii to the mainland

U.S. is fumigation with EDB at ½ lb. per 1,000 cu. ft. for 2 hours at a temperature of not less than 70° F. The treatment injured some bananas and not others. Investigations showed that the tolerant fruit came from a wet district where it was the practice to cover developing bunches in the field with sacks. The injured fruit came from drier districts where bunches were left uncovered. Only bunches covered with opaque or semi-opaque materials for at least 2 months prior to harvest proved tolerant to EDB. Several factors which might have contributed to this effect having been eliminated, it is concluded that tolerance is associated primarily with reduced chlorophyll development.

Cacao.

(*See also* 1096, 1132b, g, r, 1133s, 1146, 1150.)

1002. ANGLADETTE, A.
Les recherches agronomiques relatives au cacao dans les territoires d'outre-mer. Introduction. (**Cacao research in French overseas territories. Introduction.**) [English and Spanish summaries 7 lines each.]
Agron. trop., 1954, **9**: 391-3.

This short paper forms the introduction to a series of 8 papers on cacao research in French overseas territories to which the current number of *l'Agronomie tropicale* is devoted. The 3 factors governing cacao production in these territories at present are (1) parasitic diseases, especially swollen shoot, (2) lack of improvement in methods of propagation and cultural practices resulting in stationary yields, and (3) a (sometimes) unsatisfactory standard of processing due in part to the producers' dissatisfaction with prices. A new research service is being established to direct, coordinate and control research on cacao, coffee and tea.

1003. POUPART, Y.
La production cacaoyère dans les territoires d'outre-mer. (**Cacao production in the [French] overseas territories.**) [English and Spanish summaries 14 and 15 lines.]
Agron. trop., 1954, **9**: 394-407.

Notes and statistics are given on cacao production in the Ivory Coast, French Cameroons, Togo, French Equatorial Africa and Madagascar. Total production has risen since the war and in 1952/53 exceeded 120,000 metric tons.

1004. ALÈGRE, G.
Les conditions climatologiques de la production cacaoyère dans nos territoires d'outre-mer. (**Climatic conditions for cacao production in French overseas territories.**) [English and Spanish summaries, 16 lines each.]
Agron. trop., 1954, **9**: 408-26, bibl. 6.

The climatic requirements of cacao are summarized and information is given on the climates of the cacao-growing areas in the French colonies. The whole of the forest zones of the Ivory Coast, Togo, the Cameroons and Gaboon are climatically suitable for cacao.

1005. BURLE, L.
Aperçu sur les problèmes agronomiques. (**A glance at the agronomic problems [connected with cacao growing in the Ivory Coast and French Cameroons].**) [English and Spanish summaries 17 and 18 lines.]
Agron. trop., 1954, **9**: 452-6, illus.

An account is given of cacao research in progress in the Ivory Coast and the French Cameroons on breeding and selection, on propagation by cuttings, and on certain cultural problems, namely, planting in cleared strips under forest shade, temporary and permanent shade for plantations on cleared land, cover crops, spacing and manuring.

1006. INTER-AMERICAN CACAO CENTER.
Some results of cacao investigations at the Inter-American Cacao Center.
Cacao, 1954, **3** (3): 1-2.

Results are summarized briefly. *Phytophthora infestans.* In field tests bordeaux mixture applied monthly or 2-monthly gave better control of black pod than either Dithane Z-78 or SR-406 (Orthocide 50) applied monthly. Bordeaux and Dithane applied monthly each increased production about 40% compared with the control or Orthocide spray. In fungicidal screening tests 2% Perenox was as effective as 4-4-50 bordeaux against the fungus on seedlings but Zinc-Copposil and Combacide gave no control. *Trunk growth.* At "La Lola" farm during 2 years, maximum growth occurred between June and August, and very little growth between December and February. There was a highly significant positive correlation between trunk growth and number of hours with temperatures above 30° C. Flushing peaks did not follow peaks of trunk growth. Flowering and fruit setting closely followed the cycle of trunk growth. It was found also that the loss of young fruits due to wilt is related to the decrease in rate of trunk growth and that, in general, it follows periods of intense leaf flushing. *Fertilizer tests.* Tests conducted in cacao seed beds at Turrialba show the existence of Mg and Ca deficiencies. The soil was acid and had a high level of K. The disorder expressed itself as a loss of green colour between the veins on the centre of the leaf blade followed by necrosis, a browning of the affected areas and death of the leaf. Leaves taken from plants showing the deficiency contained less than 0·2% Mg and had a very low level of Ca, but a high level of K.

1007. CIFERRI, R., AND CIFERRI, F.
A standard grading of fresh cacao beans.
Maveg., 1954, **1**: 329-39, bibl. 19, colour plate.

The method suggested for the selection of cacao beans for breeding purposes is based on the colour of a cross section of the cotyledons in mature beans. The commoner colours encountered in several types of cacao are shown in colour.—Univ. Pavia.

1008. VAN DER KNAAP, W. P.
Verband tussen zaadgrootte en de groei van cacaoplanten. (**The relation between bean size and growth of cacao plants.**) [English and Indonesian summaries 17 and 19 lines.]
Bergcultures, 1954, **23**: 421-5.

Examination of pods from 4 clones showed that, in general, the beans from the middle of the pod were slightly heavier than those from either end. The seedlings produced by beans from different positions in the pods did not, however, show any differences in growth. There was also no relationship between bean weight and cotyledon colour.

1009. OSTENDORF, F. W.
Het takstelsel van de cacao. **(The branch system of cacao.)**
Surinaam. Landb., 1954, **2** (3): 98-104, from abstr. in *Trop. Abstr.*, 1954, **9**, No. 2336.

The morphology of the branch system in cacao is described and the influence of physiological factors on the formation of orthotropic and plagiotropic branches is discussed.

1010. (MACHICADO, M.)
Diagnosis of mineral deficiencies of cacao by visual symptoms and by pot tests in the green house and by trunk injections.
Cacao, 1954, **3** (3): 3.

Symptoms of deficiency of N, P, K, Mg, Ca, Fe, S, B, Zn, Cu and Mn were recorded in cacao seedlings grown in sand with various nutrient solutions added. *Method of diagnosis*. In greenhouse trials lasting 5–6 months cacao seedlings were grown in the soils under test, various nutrient solutions being added and data being taken on leaf dry weight and rate of growth and assimilation. This was a practical and satisfactory means of determining within a short time the nutrients necessary for optimum growth in a given soil. *Liquid injections*. Trunk injections of N, P or K had no effect on healthy pod yield.

1011. VALLAEYS, G.
Le problème de l'ombrage du cacaoyer. **(The problem of shading cacao.)**
Bull. Inf. INEAC, 1954, **3**: 191-216, bibl. 17, illus.

The problem of shading cacao is reviewed under the following headings: the direct effect of light, shade and the soil, temperature and humidity, artificial shade, natural shade from existing forest or regrowth or from induced regrowth, density of shade, spacing of cacao, regulation of artificial and natural shade, temporary shade from crops such as *Tephrosia*, cassava and small, short-lived trees. The author is in favour of natural shade.

1012. ORELLANA, R. G.
Chemical control of pests and diseases of cacao.
Comun. Turrialba, **51**, 1954, pp. 14, bibl. 49.

This review discusses pests and insecticides, diseases and fungicides, cherelle wilt, weed control, adhesives, spraying and dusting.

1013. HOLLIDAY, P.
Control of witches' broom disease of cacao in Trinidad.
Trop. Agriculture Trin., 1954, **31**: 312-17, bibl. 14.

The control of witches' broom disease can be satisfactory in Trinidad—if brooms are removed every April and October—except on heavily diseased old fields and on very susceptible varieties. As cacao cultivation becomes more intensive so will this control method increase in efficiency. Pod losses are considered to be due to infection by basidiospores from a nearby source. They can be controlled within a field even if surrounding fields are heavily infected. Brooms often result from infection arising at a more distant source. To reduce them, control must be carried out over larger areas than those necessary to control pod infection. [Author's summary.]

1014. MAGNIN, J.
La lutte contre les insectes nuisibles au cacaoyer dans l'Ouest Africain. **(The control of insects injurious to cacao in West Africa.)** [English and Spanish summaries ½ p. each.]
Agron. trop., 1954, **9**: 467-78, bibl. 11.

Information is given on the insect pests of cacao in the Ivory Coast and their control. They include scolytids, especially *Xyleborus morstatti*, attacking young plants; the capsid bugs, *Sahlbergella* and *Distantiella*, which can be controlled by DDT, BHC or aldrin; mealy bug vectors of swollen shoot, especially *Pseudococcus njalensis*, which have been controlled experimentally with hanane; cerambycid and cossid borers; other pod pests including *Helopeltis*; and *Selenothrips rubrocinctus*.

1015. LAVABRE, E. M.
Insectes dangereux aux cultures du cacaoyer au Cameroun. **(Insects dangerous to cacao crops in the [French] Cameroons.)** [English and Spanish summaries 8 lines each.]
Agron. trop., 1954, **9**: 479-84, illus.

Notes are given on the following insects, on the injury they cause and on their control: the capsid bugs *Sahlbergella singularis*, *Distantiella theobromae* and *Helopeltis bergrothi*; *Achaea catocaloides*; *Atelocera serrata*; several cerambycid and lepidopterous trunk and branch borers; and the psyllid *Mesohomotoma tessmanni*.

1016. HAYWARD, L. A. W.
The origins of infestations of cocoa by tobacco beetle in Nigeria.
Emp. J. exp. Agric., 1954, **22**: 133-7, bibl. 6.

Considerable damage to cacao beans stored in Nigeria has recently been caused by the tobacco beetle, *Lasioderma serricorne*. The greatest incidence of the pest was reported during the driest months, February and March, and lowest incidence between June and August, the wettest months.

Cinchona.

1017. GÉRIN, L.
La culture des quinquinas et la production de quinine au Cameroun français. **(Cinchona growing and quinine production in the French Cameroons.)**
J. Agric. trop. Bot. appl., 1954, **1**: 21-40, illus.

The area under *Cinchona ledgeriana* at Dschang Station and its substations is at present 134 ha. and it is intended to increase this to 450 ha. Plant material is distributed to peasant farmers whose total area is at present 35 ha. of *C. ledgeriana* and 173 ha. of *C. succirubra*. A new processing factory being built at

Dschang will be capable of an annual production of 7 to 8 tons of quinine. Notes are given on germination beds, grafting, bark analysis for selection purposes, bark yields on a 10-year cycle at an initial planting density of 12,000 plants per ha., bark harvesting, quinine manufacture, diseases and pests.

Coconuts.

(*See also* 402, 762, 1132r, w, 1133b.)

1018. Eden, D. R. A.
The management of coconut plantations in Western Samoa.
Tech. Pap. S. Pacific Commiss., **48**, 1953, pp. 32, illus.

Subjects discussed include soils, cattle rearing on estates, live fencing, fodder plants, weed control, management, labour, collection, transport, cutting and chopping of nuts, copra processing, yields and rhinoceros beetle control. Detailed plans are provided of a hot air copra drier designed to accommodate 4,500 lb. of fresh copra every 24 hours.

1019. Cutter, V. M., Jr., and Wilson, K. S.
Effect of coconut endosperm and other growth stimulants upon the development *in vitro* of embryos of *Cocos nucifera.*
Bot. Gaz., 1954, **115**: 234-40, bibl. 11, illus.

The best growth *in vitro* of coconut embryos was obtained in sterile filtered liquid endosperm (milk) from young green coconuts. Heating the "young milk" depressed its growth-promoting activity. Milk from mature coconuts was markedly inhibitory to the growth of excised embryos; the inhibitory factor was heat-stable. Mature cellular endosperm was also inhibitory to embryo growth. This inhibition was greater in the dark than in the light. The inhibitory activity of mature milk was accentuated by the addition of mature cellular endosperm. Young cellular endosperm did not inhibit embryo growth. These experiments suggest that factors inhibitory to the growth of coconut embryos may develop in the milk and solid endosperm of coconut as the fruit matures and may function in initiating and maintaining the dormancy of the embryo. [Authors' summary.]—Universities of North Carolina and Yale.

1020. Kent, G. C.
Cadang-cadang of coconut.
Philipp. Agric., 1953, **37**: 228-40, bibl. 10, illus.

Research work on cadang-cadang of coconut is surveyed. The symptoms appear as bronzing of the outer leaves and tufting of the young leaves, progressing to death of the growing point. The cause of the disease is unknown, but it is probably not caused by a fungus or bacteria or by insect feeding. There is some indication of disease transmission by a leafhopper and by pollen. It is also possible that the disease is nutritional, as little is known about the nutritional requirements of the coconut.

1021. Rao, P. G.
Diseases of coconut in Andhra State.
Bull. Indian Centr. Coconut Cttee, 1954, **8**: 47-8.

In preliminary trials in 1952/53 budrot (*Phytophthora palmivora*), the most serious disease of coconut palms in Andhra State, was effectively controlled by a single spray of perenox applied between October and February at a concentration of ¼ oz. per gal. water and a rate of about ⅔ gal. spray fluid per tree.

1022. Rao, V. T., and Perraju, A.
Coconut growing in Andhra State and its destructive pests.
Bull. Indian centr. Coconut Cttee, 1954, **8**: 61-70, bibl. 4.

A table gives the names of the insect pests of coconut palms and of subsidiary crops grown in coconut plantations and brief notes on damage and control. The coconut nursery pests listed are termites, bagworms (*Mahasayana* sp.), *Pseudococcus longispinus*, mites, *Aspidiotus destructor* and *Gangara thyrsis*. The pests of adult coconut palms listed are *Oryctes rhinoceros*, *Nephantis serinopa*, *Rhynchophorus ferrugineus*, the slug caterpillar (*Natada nararia*) and rats.

1023. Tjoa Tjien Mo.
The control of the most important coconut pests in eastern Indonesia.
Philipp. Agric., 1953, **37**: 283-91, bibl. 14, illus.

Serious insect pests attacking coconut palms in eastern Indonesia are listed and illustrated. Attempts to control *Promecotheca* spp., *Aleurodiscus destructor*, *Aspidiotus destructor rigidus*, *Sexava* spp. and *Darna catenatus* by biological means have not yet been successful. Control of *Brontispa longissima* var. *selebensis* was very successful after the introduction of its parasites; after this pest had been controlled, infestations of the secondary pest *Aleurodiscus* declined. *Darna* may be controlled by spraying with DDT.

1024. Simmonds, H. W.
The rhinoceros beetle, *Oryctes rhinoceros.* Certain factors which may tend to inhibit its increase or check its spread in Fiji.
Agric. J. Dep. Agric. Fiji, 1953, **24**: 89-92, bibl. 1.

Differences in the distribution and spread of the rhinoceros beetle on introduction into Samoa and Fiji suggested that some limiting factor might be operating in Fiji. Investigations did not reveal any such factor. Insect and animal predators are discussed.

Coffee.

(*See also* 1132x, 1133p, r, 1146 1150.)

1025. Montero Gómez, J.
Selección de semilla y semillero del café.
Selection of coffee seeds and seedlings.
Rev. Agric. Costa Rica, 1954, **26**: 51-64, illus.

Information is given on the collection of fruit, selection and preparation of seed for sowing, preparation of nursery beds, sowing, selection, and transplanting of seedlings with the cotyledons still enclosed in the parchment.

1026. Thirion, F.
Modes de plantation en caféiculture.
(Methods of planting coffee.)
Bull. Inf. INEAC, 1954, **3**: 225-43.

The pros and cons are discussed of sowing at stake, planting out very young seedlings at 3 per site, sowing in nursery beds and baskets, transplanting with bare roots and ball-planting with or without a Java planter, stump planting, and planting out in baskets.

1027. SNOEP, W.
Het gebruik van takenten in robusta aanplantingen. (**The use of branch-grafts in robusta coffee plantations.**) [English and Indonesian summaries 9 and 12 lines.]
Bergcultures, 1954, **23**: 495-500, illus.

The need to rejuvenate old robusta coffee plantations by grafting is stressed. Lateral branches are generally used as scions, and consist of primary wood with secondary branches already developed. The behaviour and pruning of such branch-grafts are discussed.

1028. PÉREZ S., V. M.
Ensayos realizados en el combate del ojo de gallo con fungicidas a base de cobre. (**Experiments on the control of coffee leaf spot with copper fungicides.**)
Suelo Tico, 1953/54, **7**: 177-87, illus.

Five copper fungicides were compared in experiments made in Costa Rica in 1951/53 on the control of leaf spot (*Omphalia flavida*) and black rot (*Pellicularia koleroga*) in coffee. Monthly spraying with 50% perenox at 2 lb. or 52% tribasic copper at 4 lb. per 100 gal. water gave complete control of leaf spot. Monthly spraying with 1½ or 2 lb. perenox or 2 or 3 lb. tribasic copper per 100 gal. water was very effective against black rot and stopped its spread. [See also *H.A.*, 24: 914.]

1029. GUDE, C. J.
Directe bestrijding van witte luizen op robustakoffie. (**Direct control of mealy bug on robusta coffee.**) [English and Indonesian summaries, 8 and 10 lines respectively.]
Bergcultures, 1954, **23**: 469-73.

In small scale experiments on controlling mealy bug (*Pseudococcus citri*), hanane was used in both liquid and capsular forms. The phytotoxic effect of the insecticide masked any effect on the mealy bug.

1030. MONTI, J. R.
La lutte contre le *Stephanoderes hampei* dans la Cuvette centrale congolaise. (**Control of *Stephanoderes hampei* in the central Congo basin.**) [Flemish summary 1½ pp.]
Bull. agric. Congo belge, 1954, **45**: 817-85, illus.

A detailed account is given of a successful spraying campaign against *Stephanoderes hampei* in the 319-ha. Likete coffee plantation in 1953. The apparatus was a Swissatom 2000. The chief insecticide used was a BHC wettable powder containing 20% of the gamma isomer; others were aldrin, dieldrin, aldrex, dieldrex and resitox (DDT). Part 1 is concerned with such basic principles as method and rate of application, number of applications, nature and severity of the damage. Part 2 deals with the organization of the campaign and the supply of BHC insecticide and water, the effect of the BHC treatments, trials with the other insecticides, and remarks and conclusions. Two difficulties were water supply and deposition of the wettable powder in the pipes and valves of the sprayer in cases where BHC had to be left for some time in the tank. The use of a BHC oil emulsion is recommended.

1031. CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE.
Researches on the technology of coffee.
Indian Coffee, 1954, **18**: 168-71.

Work during the period July, 1952 to March, 1954 included preliminary experiments in which, by the use of coffee husk ash and plantain stem ash, the mucillage on parchment coffee was removed in less than 2 hours compared with 24–48 hours in the normal fermentation process.

1032. LEFÈVRE, P. C.
Détermination de la valeur organoleptique de graines de café marchand après traitement au H.C.H. de cerises en champs et de fèves en parche. (**Organoleptic tests on coffee beans after treatment with BHC of cherries in the field and of beans after depulping.**)
Bull. Inf. INEAC, 1954, **3**: 261-3.

Samples were submitted to 6 Belgian and British establishments. No adverse comments were made on flavour except in one case in which the beans from treated trees were reported to have a "grassy" or sourish flavour. It was concluded that BHC at the strength used does not affect the flavour of dried coffee beans.

Guavas.

(*See also* 886.)

1033. NAITHANI, S. P., AND CHANDRA, V.
Systematic study of some locally grown guavas, *Psidium guajava* Linn., of Allahabad.
Sci. and Cult., 1954, **20**: 133-5, bibl. 13.

Data are tabulated on tree height and fruit characters of 7 Allahabad guava varieties, 4 of which are named.

1034. DU PREEZ, D.
Propagation of guavas.
Fmg S. Afr., 1954, **29**: 297-9, illus.

The usual methods used for vegetative propagation of guava are briefly described. Rooting by branch layers can be improved by winding wire tightly round the branch before burial. Modification of stoolbed routine also improved rooting; the young trees were severely pruned in October and shoots allowed to develop until the beginning of January, when some were thinned, and the remainder tightly bound with copper wire. The wired shoots showed much improved rooting over unwired shoots after 9 months.

1035. DE GARCIA PAULA, R. D.
Goiaba e seus produtos (*Psidium guayava* Raddi)—Grande fonte de vitamina C. (**The guava and its products—an important source of vitamin C.**)
Bol. INT, 1952, 3 (7): 7-13, bibl. 8 [received 1954].

Three varieties of guava were analysed for vitamin C in 1948 and 1949. The vitamin C content was higher in red than in paler varieties and was highest in the skin. The average content for the whole fruit was 153 mg.

per 100 g. in the red variety, 108 in the orange-yellow and 93 in the white.

Mangoes.

(*See also* 51, 520, 886, 1133e, o.)

1036. Thrower, L. B.
Commercial horticulture in the Sudan. 2. Mango cultivation.
Bull. Minist. Agric. Sudan **11,** 1954, pp. 66, bibl. 25, illus.

Mangoes were introduced into the Sudan 40 or 50 years ago, but as yet they are not widely grown commercially. The bulletin, which will be useful to the prospective as well as the present grower, is concerned with environmental requirements, botanical classification and characteristics, propagation, planting, grove management, harvesting, and pests and diseases.

1037. Singh, L. B.
Propagation of mango by air-layering for root stocks.
Proc. Amer. Soc. hort. Sci., 1954, **63**: 128-30, bibl. 5.

Marcotting trials were carried out on mature trees of 12 mango varieties with a view to raising clonal rootstocks. Alpha naphthaleneacetic acid gave better results than *β*-indoleacetic acid, a concentration of 1 p.p.m. being more satisfactory than lower concentrations. Two-year-old shoots rooted much more readily than 4-year-old shoots. Age of tree appeared to have little effect on rooting provided the shoots were young. Some success was obtained with all the varieties tested, those in the semi-vigorous group giving the highest percentage of rooting. However, 1 variety in the dwarfing group, Brindabani, and 2 in the vigorous group, Machhali and P.S. No. 2, rooted very satisfactorily. [For a preliminary account see *H.A.*, 23: 3557.]—Hort. Res. Stat., Saharanpur, U.P., India.

1038. Singh, S. M.
Studies on *Apsylla cistellata* Buckton causing mango galls in India.
J. econ. Ent., 1954, **47**: 563-4, bibl. 7.

Apsylla cistellata transforms mango buds into galls and causes extensive crop losses. The trouble is commonest and most severe on grafted varieties. In preliminary trials trees sprayed at fortnightly intervals from February till May with a tar-oil wash, 3·75% BHC and 3% crude oil emulsion showed reductions of 98·5, 85 and 75%, respectively, in the formation of galls. A 3% tar-oil wash applied in September before hatching of the eggs reduced gall formation by 80%.

1039. Singh, K. K., Kapur, N. S., and Mathur, P. B.
Further studies on the cold storage of mangoes.
Indian J. agric. Sci., 1954, **24**: 137-48, bibl. 10.

In trials in 1952 Totapuri (Bangalora) full-grown but unripe mangoes were stored for up to 8 weeks at 5 temperatures ranging from 35–38° F. to 52–55° F. and 85–90% R.H., at 67–70° F. and 70–85% R.H. and at room temperature (73–85° F.) and 50–75% R.H. The results were: (1) weight losses were least at the lowest temperature (35–38° F.) followed by the next lowest; (2) 42–45° F. gave the lowest wastage due to low temperature injury and fungus diseases; (3) % total soluble solids increased at all temperatures except the lowest; (4) in general, total acidity decreased during storage especially at the higher temperatures; (5) maximum retention of ascorbic acid occurred at 39–42° F. and 42–45° F.; (6) respiration measurements made at 67–70° F. of mangoes stored at various temperatures showed a climacteric to occur in every case followed by a decline. The conclusions were that (1) the optimum conditions for the cold storage of Totapuri mangoes are 42–45° F. and 85-90% R.H., the storage life being 7 weeks; (2) fruit thus stored can best be ripened at 67–70° F.—Centr. Food tech. Res. Inst., Mysore. [See also *H.A.*, 24: 925 and 2002.]

Oil palms.

1040. Hartley, C. W. S.
The improvement of natural palm groves.
J. W. Afr. Inst. Oil Palm Res., 1954, No. 2, pp. 8-41, bibl. 9, illus.

Over 90% of the palm oil and nearly 99% of the palm kernel exports from Nigeria come from natural or semi-wild palm groves. Serious consideration was first given to ways of increasing the production of these palmeries in 1923. The author reviews in detail the various replanting trials and surveys that have been made since then. Experience has shown that simple replanting of unselected seedlings without manuring or particular attention to planting technique is generally unlikely to be successful. Surveys have shown that palmeries vary considerably in composition, yield and bunch weight. Yield in one area has been shown to rise with the density of smooth-stemmed palms and in another to decline with the proportion of low oil producing *macrocarya* palms. Trunk rot, due to *Ganoderma* spp., may seriously reduce yields in some areas. The main factors involved in the improvement of palmeries are discussed and the treatments being applied in a pilot improvement experiment started at Obio-Akpa in 1953 are described.

1041. Anon.
The rate of germination of large lots of seed.
J. W. Afr. Inst. Oil Palm Res., 1954, No. 2, pp. 138-40, bibl. 3.

Average results obtained over 3 years with very large lots of oil palm seeds germinated in oven-type or hot water germinators show that after 1 month about 20% of the seed had germinated and after 4 months about 50%. Thereafter germination tailed off, a maximum of nearly 60% being reached at the end of 7 months. The practical implication is that bulk lots of seed should be sown early in September, so that a majority of the seedlings raised may be of the right size for planting out early in the rainy season (April).

1042. Allen, J. D.
The effect of cultural treatments on losses in the nursery.
J. W. Afr. Inst. Oil Palm Res., 1954, No. 2, pp. 42-52.

Experiments on nursery technique carried out at the former Oil Palm Research Station in the period 1945 to 1950 are described. The following treatments are shown to be of use in reducing losses or in increasing the size and vigour of oil palm seedlings. (1) Watering at planting. (2) Watering in the dry season at the rate of one gallon per seedling per week. (3) Shading in the dry season. [Author's summary.]

1043. BULL, R. A.
A preliminary list of the oil palm diseases encountered in Nigeria.
J. W. Afr. Inst. Oil Palm Res., 1954, No. 2, pp. 53-93, bibl. 38, illus.

In this detailed review the author groups the diseases of the oil palm into the following sections: (1) Diseases caused by nutrient deficiencies, (2) leaf chloroses of uncertain origin, (3) stem diseases caused by fungi, (4) leaf diseases other than those ascribed to nutritional causes, (5) root diseases, and (6) fruit and bunch diseases. For each disease an account is given of the symptoms, synonyms, cause when known, and distribution. A key is provided as an aid to the identification of the principal diseases in the field, and further assistance is given by illustrations, a number of them in colour, of characteristic symptoms.

1044. BULL, R. A.
Studies on deficiency diseases of the oil palm. 1. Orange frond disease caused by magnesium deficiency.
J. W. Afr. Inst. Oil Palm Res., 1954, No. 2, pp. 94-129, bibl. 8, illus.

The external symptoms of orange frond disease and confluent orange spotting are compared, and histological differences between leaves affected by these diseases are described. Injection trials have shown that symptoms of orange frond disease can be suppressed by leaflet-tip injections of solutions containing Mg. Orange frond disease has also been cured by spraying affected leaves with a 2% magnesium chloride solution. Leaf analyses by the Long Ashton tissue method have shown that in healthy and diseased leaves of a comparable age, the former contain approximately twice as much Mg as the latter. Evidence is presented which indicates that there is no direct correlation between leaf Mg content and the severity of symptoms. Colour changes in diseased leaves may depend on progressive degeneration of chlorophyll pigments, rather than on progressive losses of leaf Mg. Experiments suggest that frond symptoms may develop fairly abruptly when leaf Mg falls below a certain threshold value. Upper and lower rank leaflets on leaves from healthy and deficient palms differ as regards their Mg content; upper rank pinnae contain smaller amounts of Mg and are usually the first to show deficiency symptoms. In deficient palms young leaves which show no symptoms may be in a state of incipient Mg deficiency. It is concluded that orange frond disease is caused by Mg deficiency, and this conclusion is supported by the results of a fertilizer trial, in which soil application of 10 lb. magnesium sulphate per affected palm has cured the disease in nine months. No increases in yields have yet appeared, however. Histological differences may explain why symptoms of Mg deficiency are reversible, while those of K deficiency are irreversible. Difficulties arising from genetic differences between palms are discussed, and the necessity for taking such differences into account when comparing results from leaf analyses is stressed. [From author's summary.]

1045. BACHY, A.
Contribution à l'étude de la pourriture du coeur du palmier à huile. (**A contribution to the study of crown rot in the oil palm.**)
Oléagineux, 1954, **9**: 619-27, bibl. 16, illus.

An investigation of crown rot at the I.R.H.O. station at Sibiti in southern Middle Congo covered the different forms of the disease, the distribution of the disease within a plantation, the effect of age of palms and of genetic and environmental factors, the insects and fungi associated with the disease, mineral deficiencies, chlorophyll synthesis, and plant hormones and their effect on growth. It is concluded that crown rot originates from a hormonal disturbance which results in abnormal growth. The causes of the disturbance are not yet clearly understood but may be connected with reduced photosynthesis and sap movement during the long dry season and with poor root growth.

1046. ALLEN, J. D., AND BULL, R. A.
Recent severe attacks on oil palms by two new caterpillar pests belonging to the Limacodidae.
J. W. Afr. Inst. Oil Palm Res., 1954, No. 2, pp. 130-7, bibl. 1, illus.

Recent attacks by caterpillars on oil palms in the Eastern Region of Nigeria and at W.A.I.F.O.R. Main Station are described. The species involved at the Main Station has been identified as *Parasa* sp. nr. *serratilinea* B.B., while the pest responsible for the outbreaks in the Eastern Region probably belongs to the same genus. In both the epidemics described above the pest has ultimately been controlled by natural enemies. [Authors' summary.]

1047. BIENAYMÉ, A.
Les huiles de palme et leur richesse en carotène. (**Palm oils and their carotene content.**)
Oléagineux, 1954, **9**: 603-10.

Chemical analyses made by I.R.H.O. of oil palm material from different parts of the world show that the residual fibre oil is about 3 times richer in carotene than the expressed or centrifuged oil. The reason is that the carotenoid pigments are chiefly concentrated in the epicarp of the fruit. The carotene contents of samples of dry fibre from French West Africa and the French Cameroons ranged from 0·2 to 0·58 g. per kg. of fibre. The erection of a plant for the recovery of fibre oil would not be economic at present, but oil palm fibre oil could become the world's richest plant source of carotene.

Papaws.

(*See also* 51.)

1048. AGNEW, G. W. J.
The papaw.
Qd agric. J., 1954, **79**: 77-90, illus.

The papaw is grown in the coastal regions of Queensland. Varieties of interest in current plant improvement work are Bettina and Improved Petersen and their hybrids, Hortus Gold and Hawaiian Solo. Nearly all commercial plantings in Queensland are grown from open-pollinated seeds and consist of a mixture of plant types. Management of plantations is outlined.

Pineapples.

(*See also* 577, 991, 922, 1133i.)

1049. DEPARTMENT OF AGRICULTURE, MALAYA.
Notes on current investigations (Agronomy), January to March, 1954. Pineapple.
Malay. agric. J., 1954, **37**: 102.

In a factorial cultural and manurial trial in Johore, plant crop yield per acre was much higher in plots spaced 1×2×4 ft. than in plots spaced 6×2 ft. A second trial in Johore also showed that yields can be increased by close spacing, but planters consider that closer spacings than 2×2×5 ft. are impracticable. Observations on minor element experiments suggest that nutrient sprays of Cu, Mn, and Fe are all proving beneficial.

1050. CHEN, C. T., AND WEI, C. T.
On certain chemical and physical characteristics of pineapple field soils and their effects on productivity ratings. [Chinese, with English summary 2½ pp.]
Mem. Coll. Agric. nat. Taiwan Univ., 1954, **3** (3): 81-110, bibl. 30.

A study of red latosol soils on 4 pineapple farms showed drainage and water-holding capacity to be the dominant factors determining their productivity.

1051. LUGO-LÓPEZ, M. A., AND OTHERS.
Influence of filter-press cake on pineapple yields and soil properties.
Soil Sci., 1954, **78**: 257-65, bibl. 10.

At Arecibo pineapple plants receiving 32 tons of filter-press cake and 1,500 lb. of a 12-6-10 fertilizer per acre gave as high yields and as large fruits as plants receiving double the amount of fertilizer only. At Corozal, 3,000 lb. of the fertilizer with 32 tons of filter-press cake per acre gave the maximum yields. Soil analyses showed that the addition of filter-press cake to the soil tended to raise the level of organic matter and to increase its water-holding capacity.—Univ. Puerto Rico agric. Exp. Stat., Rio Piedras.

1052. SANFORD, W. G., AND OTHERS.
Toxicity to pineapple plants of biuret found in urea fertilizers from different sources.
Science, 1954, **120**: 349-50, bibl. 4.

Leaf tip die-back in pineapple plants, observed after application of urea sprays, was thought to be caused primarily by urea itself. Further investigations, however, showed a positive correlation between toxicity symptoms and the amount of biuret found in the urea; 3% biuret was sufficient to cause die-back and yellowing.—Pineapple Res. Inst., Hawaii.

1053. OXENHAM, B. L.
Notes on two pineapple diseases in Queensland.
Qd J. agric. Sci., 1953, **10**: 237-45, bibl. 9, illus.

The symptoms are described of two common, but rarely serious, diseases of pineapples in Queensland, white leaf spot and fruitlet core rot. Inoculation tests have confirmed that the former is caused by *Thievaliopsis paradoxa*, but as this fungus is purely a wound parasite of pineapples control measures are unlikely to prove necessary. Isolations from fruitlets infected with core rot yielded a *Fusarium* sp. and two types of *Penicillium*. Circumstantial evidence suggests that mealy bugs and mites provide a means of entry for the causal organism.

Rubber trees.

(*See also* 1132f, z, 1133a, f, x, 1136, 1146.)

1054. RUBBER RESEARCH INSTITUTE OF MALAYA.
Annual Report of the Rubber Research Institute of Malaya 1952, 1954, pp. 115.

Work covered in this report includes: *Soils Division:* Soil survey and classification, manurial experiments, weed control, mechanical cultivation, P and N studies, residual arsenic toxicity investigations, plant nutrients in soils, new methods of chemical analysis of soil and plant material, and tree nutrition studies. *Botanical Division:* Breeding and selection, trials with the RRIM "500" and "600" series, budwood exchange with Brazil, tapping experiments, and yield stimulation with hormones and copper sulphate. *Pathological Division:* Root disease control in replanting old rubber, mouldy rot control experiments with synthetic detergents and acid tar fungicides, and eradicative control of South America leaf blight (in the event of an attack) by defoliation with 2,4,5-T in oil. *Chemical Division:* Latex chemistry, and the preparation and preservation of concentrated latex.

1055. I.R.C.I.
Institut des Recherches sur le Caoutchouc en Indochine. Rapport annuel 1953. **(Annual report of the Institute for Research on Rubber in Indo-China for 1953)**, 1954, pp. 183.

Division of Agronomic Experiments and Meteorology. Breeding and selection, stock-scion relationships, study of trees in paired lines, tapping systems, manuring, planting density, effect on latex production of copper sulphate sprays against *Corticium*. *Anatomy and Physiology Laboratory.* Injections for yield stimulation,* bark anatomy studies, leaf analysis*. *Phytopathology Division. Corticium*, *Phytophthora palmivora*, *Oidium* and physiological diseases of the tapping panel. *Chemistry and Technology Department.* Variation of latex in relation to coagulation, centrifuging studies, leaf analysis, mineral composition of latex. *Laikhê and Tapao Experimental Stations.*

1056. DE SILVA, C. A.
Planting material.
Quart. Circ. Ceylon Rubb. Res. Inst., 1953 (issued 1954), **29** (3/4): 61-74.

An account of the breeding and selection work of the Institute is followed by a consideration of the relative merits of budded rubber and clonal seedlings as planting material. Recommendations are then made on planting material, which is divided into 3 groups. Group A consists of the best of the older, high-yielding clones together with promising, well-tested, newer clones and clonal seedlings and should be planted on 80% of the total acreage; it includes PB.86, AV.255, PR.107, WG.6278, MK.3/2, RR.501, Gl.1, selfed seed of Tj.1 and Prang Besar Isolated Garden seed from Malaya. Group B consists of 8 new clones which have shown promise when compared with standard local and foreign clones; they should be planted on rather less than 20% of the acreage. Group C consists of certain promising local and foreign clones and local clonal seedlings about which information is still limited; only small areas of each should be planted. Notes are given on the recommended clones.

---

* See separate abstracts.

1057. RISDON, E. J., AND OTHERS.
Some aspects of the relation between replanting and "manufacture".
Quart. Circ. Ceylon Rubb. Res. Inst., 1953 (issued 1954), **29** (3/4): 85-129, illus.

One of the 5 sections of this paper is concerned with the choice of planting material from the "manufacture" point of view. Three aspects of this question are considered. (1) *Latex colour*. Water-white or near water-white sole or blanket crepes at present command a significant premium over the lower grades. The R.R.I.M. clones are listed in descending order of whiteness. (2) *Precoagulation of latex intended for crepes and R.S.S.* Uncontrolled or inadequately controlled precoagulation can cause considerable financial loss, but a tendency to precoagulation, such as occurs in young trees and in Tj.1 and Av.49, need not necessarily render a clone unsuitable for large-scale planting. Where crepe is the main product anticoagulation can often be practised with marked success. Where R.S.S. is the main product and the distances between task and factory are large, a tendency for bubbles to form in the finished sheets may be found but small bubbles are not objected to in certain R.S.S. grades. (3) *Clones for latex concentrate manufacture* should give a high yield of stable latex.

1058. RUBBER RESEARCH INSTITUTE OF MALAYA.
R.R.I. news.
Plant. Bull. R.R.I.M., 1954, No. 14, p. 100.

In a large-scale trial of clones RRIM 619–630 on the R.R.I. Experiment Stations, RRIM 621 and 623 have proved the most vigorous and RRIM 629 the least.

1059. EVERS, E.
L'incinération et la non-incinération en hévéaculture. **(To burn or not to burn in rubber growing.)**
Bull. Inf. INEAC, 1954, **3**: 217-24, bibl. 2.

The effects of burning on the growth and productivity of rubber trees, on the period of utilization of a plantation site, and on the yield per unit area, and the economics of burning and non-burning are discussed. It is concluded that burning is more harmful and expensive than non-burning.

1060. RUBBER RESEARCH INSTITUTE OF MALAYA.
Establishing a legume cover.
Plant. Bull. R.R.I.M., 1954, No. 14, pp. 86-94, illus.

The creeping legumes most widely used under rubber in Malaya are *Centrosema pubescens*, *Pueraria phaseloides* (syn. *P. javanica*) and *Calopogonium mucunoides*. Suitable seed mixtures are (*a*) 5 parts *Calopogonium*, 4 *Centrosema*, 1 *Pueraria*; (*b*) 4 *Centrosema*, 1 *Pueraria*; and (*c*) 1 each of *Centrosema* and *Calopogonium*. Instructions are given for pre-treatment of seed with acid or hot water to promote germination, inoculation with root nodule bacteria, sowing at 5 lb. per acre, manuring with phosphate and weeding.

1061. CONSTABLE, D. H.
The diagnosis of manurial requirements of hevea.
Quart. Circ. Ceylon Rubb. Res. Inst., 1953 (issued 1954), **29** (3/4): 130-9.

The Ceylon Rubber Research Institute's present manurial recommendations are designed to cover all districts, soils, clones and elevations. It is intended later to replace these with particular recommendations for each district. This paper describes manurial experiments involving leaf analysis which are being carried out in different districts with this aim in view.

1062. BOLLE-JONES, E. W.
Nutrition of *Hevea brasiliensis*. II. Effect of nutrient deficiencies on growth, chlorophyll, rubber and mineral contents of Tjirandji 1 seedlings.
J. Rubb. Res. Inst. Malaya, 1954, **14**: 209-30, bibl. 6, illus., being *Commun.* **290.**

Hevea brasiliensis seedlings were grown in pot sand culture under conditions of varied mineral status. Marked retardation in growth and visual symptoms were observed in plants given restricted supplies of each major nutrient (except calcium) and of iron and manganese. Mineral status affected the concentration of rubber in the stems and petioles during the early part of growth; later, such effects became reduced or reversed. The effects of nutrient deficiency treatments on the chemical composition of the plants are described and the low requirement for calcium and boron pointed out. [Author's abstract.]

1063. BEAUFILS, E. R.
Diagnostic foliaire. **(Leaf analysis.)**
Rapp. annu. Inst. Rech. Caoutchouc Indochine 1953, 1954, pp. 115-25.

Correlation between mineral elements. Mineral element ratios determined in addition to those given earlier [*H.A.*, 24: 957] are P/K +0·551, P/N +0·360, P/Cu −0·324, N/Fe +0·340, Cu/Mn −0·525 and Ca/Cu −0·312. A diagrammatic representation of the mineral element balance in the leaf shows that: (1) K and Ca are each correlated with 5 other elements and are in highly significant inverse correlation with one another; (2) in a given latex Cu and K appear to be governed by a number of common laws; (3) a highly significant inverse correlation exists between Mn and Cu showing the importance of the Mn/Cu ratio in the mineral element complex; (4) N, P and K appear to be governed by a number of common laws; (5) N, P, K and Cu are antagonistic to the bivalent elements Ca, Mg and Mn. *Variation in leaf mineral composition between clones and localities.* A study of 3 clones showed that differences exist in leaf mineral composition between different clones in the same field and between trees of the same clone in different fields. *Leaf mineral composition and frequency of physiological disorders of the tapping panel.* Another study established the existence of a significant inverse correlation between K_2O/CaO and the rate of such disorders, of a highly significant correlation between Mn/Cu and the rate of such disorders, and of a similar response by the K_2O/CaO and the Mn/Cu ratios to certain laws. *Leaf mineral composition and yield in Dj.1.* Studies made throughout the annual growth cycle showed that K is negatively, and Ca positively, correlated with production. The inverse correlation between K_2O/CaO and yield is highly significant, and the product $K_2O \times CaO$ is constant throughout the growth cycle. *Leaf mineral composition and latex characters.* In Dj.1 there is a significant correlation over a period between K_2O/CaO and the D.R.C. of the latex, between CaO and serum %, and between K_2O and serum %. Stimulation of production either by injection or by intensive tapping affects the D.R.C. and the leaf mineral composition. Application of fertilizers affects leaf mineral composition, production, D.R.C. and latex stability. [See also *H.A.*, 24: 4359.]

1064. Tixier, P., and Champagne, M.
Injections. (**Injections.**)
Rapp. annu. Inst. Rech. Caoutchouc Indochine 1953, 1954, pp. 103-12.

The following is a summary of the results of experiments made on the stimulation of latex production by injection or other treatment with chemicals: (1) Six-monthly copper sulphate injections over a period of 4 years gave an average annual increase in latex production of 24% without causing necrosis and there was no deterioration of the tapping panels; (2) annual copper sulphate injections into Avros 50 for 4 years gave increases of 15, 21, 20 and 3%; (3) annual copper sulphate injections into the moderate-yielding Avros 256 gave increases of 30 and 4% in the first 2 years; (4) injection of copper sulphate and painting with stimulex produced yield increases of comparable magnitude in 9 out of 13 clones; and (5) the yield increases in BD.10 a year after a single injection with copper sulphate or boric acid or a single treatment with stimulex were 35, 16 and 60% respectively.

1065. de Silva, C. A.
Tapping and tapping systems.
Quart. Circ. Ceylon Rubb. Res. Inst., 1953 (issued 1954), **29** (3/4): 142-52.

The physiological aspects of tapping and the systems of tapping commonly used in Ceylon are discussed. Recent conclusions from experiments on yield stimulation by copper sulphate injections are that the chemical damages bark, cambium and wood, that the cost of boring is uneconomical and that the latex may be contaminated by copper. Conclusions from similar experiments on the application of the hormone preparations Stimulex and Eureka are: (1) high-yielding rubber gives an average increase of 20–30%, (2) fields yielding 500 lb. per acre can give up to 75% increase in the first 14 months, (3) the increased yields last about 3 months, (4) the treatment does not result in excessive brown bast, (5) no information on ill effects of continued treatment is yet available, (6) late drip and late collections are inevitable.

1066. de Silva, C. A.
Tapping of hevea rubber.
Adv. Circ. Rubb. Res. Inst. Ceylon **40,** 1954, pp. 8, illus.

Recommendations are made with respect to minimum tappable girth, tapping intensities for budded rubber and clonal seedlings, bark consumption and height of tapping cuts, tapping heights and slope of cuts, change over systems of tapping cuts, depth of tapping, direction of tapping cut, time of day, daily task, the tapping systems, equipment, and the Morris-Mann system of early test-tapping of clonal seedlings at 12-in. girth. This circular supersedes Nos. 17 and 34.

1067. Young, H. E.
Diplodia dieback and collar rot of hevea and blue spot of crepe rubber.
Adv. Circ. Rubb. Res. Inst. Ceylon **44,** 1954, pp. 4.

Notes are given on the symptoms, prevention and cure of diplodia dieback, the nursery disease, collar rot, and spotting of crepe rubber, all of which are caused by *Botryodiplodia theobromae* (=*Diplodia natalensis*).

1068. Coles, G. V., and Byrde, R. J. W.
The fungicidal properties of coal tar distillates: Progress report.
A.R. Long Ashton agric. hort. Res. Stat. for 1953, 1954, pp. 109-20, bibl. 9.

The fungicidal efficiencies of fractions of coal tar distillates against *Ceratostomella fimbriata*, the fungus responsible for the mouldy rot disease of the rubber tree in Malaya, have been investigated. Maximum efficiency has been found to be associated with the high-boiling tar acids. Information has been obtained on the extent to which the fungicidal activities of acidic and neutral tar fractions are influenced by boiling range and the method of tar production used. The assessments of fungicidal effect by a laboratory method of bioassay, which is described, have shown good correlation with the results obtained in Malayan plantation trials. [Authors' summary.]

1069. Carpenter, J. B.
Moldy rot of the hevea rubber tree in Costa Rica.
Plant Dis. Reptr, 1954, **38**: 334-7, bibl. 9.

Mouldy rot due to *Ceratostomella* sp. has not proved so serious in Costa Rica as in Malaya. The most successful method of treatment adopted in Costa Rica was as follows: The trees were kept in tap and received an application of coal tar paint the day after each tapping. In the 6-month period from June to November no new infection was found where the coal tar had been applied regularly.—U.S. Dep. Agric. Coop. Rubb. Plant Field Stat., Turrialba.

1070. Langford, M. H., and Townsend, C. H. T., Jr.
Control of South American leaf blight of hevea rubber trees.
Plant Dis. Reptr, 1954, *Suppl.* **225,** pp. 42-8, illus.

Dithane and parzate are now recommended for the control of *Dothidella ulei* [see also *H.A.*, 24: 2027]. Economics usually make it necessary to restrict spraying operations to nursery plants and very young plantation trees. The procedure generally adopted is temporary spraying followed by top-budding with resistant clones.—Field Crop Res. Serv., U.S. Dep. Agric.

1071. Carpenter, J. B., and Stevenson, J. A.
A secondary leaf spot of the hevea rubber tree caused by *Glomerella cingulata*.
Plant Dis. Reptr, 1954, **38**: 494-9, bibl. 18.

Control is found to be correlated primarily with control of South American leaf blight (*Dothidella ulei*). Improved control of this by dithane Z-78 has reduced *G. cingulata* to a factor of minor importance in sprayed nurseries, but in unsprayed nurseries it continues to be a nuisance.

1072. Young, H. E.
Oidium leaf disease.
Adv. Circ. Rubb. Res. Inst. Ceylon **43**, 1954, pp. 8.

This circular, which supersedes Nos. 22 and 28, contains information on symptoms, injuries caused, factors favouring attack, clonal susceptibility (susceptible—Tj.1 and BD.5, moderately resistant—PB.86, PR.107 and HC.28, resistant—LCB.870), control by dusting and spraying with sulphur, and promising results in experiments with dinitrocaprylphenylcrotonate (mildex and karathane).

1073. van Emden, J. H.
Replanting and control of powdery mildew.
Quart. Circ. Ceylon Rubb. Res. Inst., 1953 (issued 1954), **29** (3/4): 42-52, bibl. 2.

Answers to a questionnaire on the incidence of oidium in sulphur dusted fields in 1952/53, a year of light attack, indicate that control was fully effective in two-thirds of the cases and also provide evidence on the relative susceptibility of clones. Records on the susceptible clone Tj.1 showed no correlation between incidence and altitude. Crown-budding the very resistant but low-yielding LCB.870 and its use as a normal budded stump are also discussed as a means of control.

1074. Carpenter, J. B.
Accelerated screening tests of fungicides for control of black stripe of the hevea rubber tree.
Plant Dis. Reptr, 1954, **38**: 487-93, bibl. 9.

Among 22 fungicides subjected to the tests described only Orthocide 50 Wettable showed enough promise to merit further tests against *Phytophthora palmivora.*

1075. Venkataramani, K. S.
"Dusting" as a measure of control of the abnormal leaf-fall of the rubber tree.
Plant. Chron., 1954, **49**: 513-16.

A trial and observations suggest that leaf-fall disease of hevea caused by *Phytophthora palmivora* can be controlled by 6% Cuprosana dust applied 3 or 4 times during wet weather between mid-May and early July at about 16 lb. per acre per round. There are several power dusters which will give adequate coverage of tall trees, provided a recommended procedure is followed.

1076. Rubber Research Institute of Malaya.
***Ustulina* root rot.**
Plant. Bull. R.R.I.M., 1954, No. 14, pp. 95-7, illus.

Notes on *Ustulina zonata* root rot and its control by the excision of dead tissue, the destruction of fructifications, and the dressing of large wounds.

1077. van Gils, G. E.
Recent developments in the production methods of natural rubber.
Indon. J. nat. Sci., 1954, **110**: 93-6.

A brief report is given on the work that has been carried out by the Indonesian Institute for Rubber Research (I.N.I.R.O.) during the last few years on the preparation of crepe rubber, sole-crepe, non-smoked sheets, blankets, purified rubber and concentrated latex.

1078. Tuason, A. M., and Cruz, A. O.
Composition of para-rubber-seed oil.
Philipp. J. Sci., 1953, **82**: 341-4, bibl. 10.

Seeds from *Hevea brasiliensis* growing in the Philippines weighed 2·6 to 4·0 g. and consisted of 41·8% shell and 58·2% kernel. The kernels contained 47·9% oil consisting principally of the glycerides of linolenic, linolic, oleic and saturated acids.

Sugar cane.

(*See also* 987, 989, 1132c, e, h-m, p, q, y, 1133d, l, m, q, v, 1146.)

1079. Colonial Sugar Refining Company Ltd.
The sugar cane industry in Fiji.
Trop. Agriculture Trin., 1954, **31**: 272-80, illus.

Production is almost entirely on small farms leased by the Colonial Sugar Refinery Company to Indians. Information is given on climate, location, acreage, the farming system, soils and fertilizers, cultural methods, varieties, diseases, harvesting, transport of cane, and field organization.

1080. Hungerford, T. A. G.
Queensland's new research station.
Sugar, N. York, 1954, **49** (5): 29-31.

Information is given on the sugar-cane industry, research and breeding in Queensland and on the Mackay Sugar Research Institute opened in August, 1953.

1081. Rao, B. V.
Sugarcane research in Mysore. Retrospect and prospect.
Mysore agric. Calendar 1954, 1954, pp. 19-22.

An important part of sugarcane research is the breeding and introduction of improved varieties. Sugarcane does not seem to require K fertilizers under Mysore conditions, unless the crop is grown intensively year after year. Phosphates placed 3 to 6 inches below the sett level have a beneficial effect on yield. Sugarcane responds readily to N, part of which should be applied as a green manure. The optimum spacing is 3 feet between the rows, with 10 to 12 thousand 3-budded setts planted per acre. Cane planted between July and October takes 14 to 16 months to mature, but yields are heavier than from cane planted between December and March which matures in 12 months. Control of the top shoot and stem borers may be obtained by earthing up young canes to bury and kill the grubs, by hand collection and by biological control.

1082. Foster, C. B.
The yield of sugar cane in Barbados in 1953.
Bull. Dep. Sci. Agric. Barbados **20**, 1953, pp. 15.

Detailed acreage and yield data are given for the low, the intermediate and the high rainfall areas. A record area of just under 46,000 acres was reaped. B.37161 occupied 76% of the acreage reaped and was followed in importance by B.41211 (12·54%) and B.4098

(7·39%). In the low and intermediate rainfall areas B.41211 outyielded B.37161 as plant cane and as first and second ratoons by 1·3–5·1 tons cane per acre. [Bulletins 17 and 19 containing similar statistics for 1951 and 1952 have also been received.]

1083. DE SORNAY, A.
Les variétés de canne B.3337, B.34104, B.37161 and B.37172. **(The cane varieties B.3337, B.34104, B.37161 and B.37172.)**
Rev. agric. Maurice, 1954, **33**: 111-15.

An account is given of the characters and performance of 4 Barbados canes introduced into Mauritius in 1945. All yield well as plant canes and ratoons under different climatic and soil conditions. B.34104, B.37161 and B.37172 are early while B.3337 matures later, at about the same time as M.134/32.—Mauritius Sugar Ind. Res. Inst.

1084. DE CHARMOY, D. D'E.
Études sur de nouvelles variétés de canne à sucre à l'Île de la Réunion. **(Studies on new sugar cane varieties in Réunion.)**
Rev. agric. Réunion, 1954, **54**: 71-8.

Information is given on R.337, M.134/32, Co. 419 and the later-bred R.331. The first 3 varieties occupy 40, 30 and 20% respectively of the total cane acreage. The first is commonest in dry sheltered sites with poor soil, the second in warm, damp, windy sites, and the third in cool, damp, sheltered sites on clay soils.

1085. KHAN, M. A., AND HALL, W. C.
Effect of growth-regulators on germination (axillary bud growth) and root development of sugar-cane stem cuttings.
Bot. Gaz., 1954, **115**: 261-71, bibl. 22, illus.

In greenhouse experiments at College Station, Texas, with single- and multiple-budded cuttings of 2 C.P. cane varieties, soaking the basal inch or immersing the cuttings in aqueous solutions of synthetic growth substances for 24 hours stimulated root development and generally retarded bud "germination". The growth substances used and the most effective concentrations were alpha-O-CPA (amine salt of alpha-ortho-chlorophenoxypropionic acid) at 10 p.p.m., and IAA, IBA and NAA at 100 p.p.m. Studies with the first two substances, and in particular with IAA, showed immersion of the whole cutting to have more effect than treating only the basal portion. Single-budded cuttings produced better root growth than multiple-budded cuttings. A negative interaction was found between shoot and leaf growth on the one hand and root development on the other. Adventitious roots were induced on intact nodes of growing stems by the application of growth substances in lanolin paste, 1% IAA being more effective than 0·1% alpha-O-CPA or a combination of the two.

1086. SUBBA RAO, M. S., AND SINHA, C. P.
Presowing induction of sugarcane setts by coloured lights.
From note in *Curr. Sci.*, 1954, **23**: 243.

In a small scale trial one-budded setts were exposed to coloured lights for 24 hours before planting. Green light stimulated germination and was followed in descending order of effect by red, white and blue.

1087. LUGO-LÓPEZ, M. A.
The effect of soil conditions on the sucrose content of sugarcane. [Spanish summary 15 lines.]
J. Agric. Univ. Puerto Rico, 1954, **38**: 132-46, bibl. 10.

Data are presented herein to show the influence of soils and soil conditions on the sucrose yield of sugarcane. Information derived from five broad geographic areas of Puerto Rico, namely: north, south, northeast, east-central, and northwest-interior, was analyzed critically. There were significant differences in the sucrose-yielding potential of several commercial sugarcane varieties among some soils within each area. These differences are attributable to variations in the properties of the various soil types or complexes, or to some factor closely connected with the soil, like drainage, chemical reaction, and so on. Some varieties produced higher sucrose yields than others even when growing under similar edaphic conditions. Different varieties of sugarcane produced their maximum yields in different soils, thus indicating a certain degree of variability and adaptation to the soil, as far as this factor was concerned. Within a given area the sucrose-yielding potential of a given soil may be modified considerably by the dominant climatic conditions. [Author's summary.]

1088. LUGO-LÓPEZ, M. A., AND CAPÓ, B. G.
The effect of elevation on the sucrose content of sugarcane. [Spanish summary 11 lines.]
J. Agric. Univ. Puerto Rico, 1954, **38**: 128-31, bibl. 6.

Data are presented to show the influence of elevation on sucrose yields of four varieties of sugarcane: P.O.J. 2878, B.H.10(12), P.R.803 and F.C.916. An over-all examination of the data from 695 crops harvested during a 10-year period, 1939–49, disclosed that elevations higher than 10 m. above mean sea level favor high sucrose accumulation in sugarcane. This effect was more pronounced with some varieties than with others. This influence of altitude is probably a reflection of climatic effects. Data are presented to show that cane growing at high elevations within a given area enjoys about the same benefits from sunlight, as measured by "total day-degrees", with the added advantage of cooler nights. [Authors' summary.]

1089. RAHEJA, P. C., AND SEKHON, G. S.
Growth studies in *Saccharum officinarum*. VII. Number of stalks in the clump in relation to weight of plant, length of millable stalk and quality ratio of the crop.
Proc. Indian Acad. Sci. Sect. B, 1954, **40**: 25-37, bibl. 22.

Number of stalks per clump, clump weight, stalk length and quality ratio were investigated in a depth of cultivation (3) × varieties (Co. 453 and Co. 312) × N(3) × P(3) trial at the Indian Agricultural Institute, New Delhi. A summary of the main results is as follows: (1) the relationships between tillering and clump weight and between tillering and millable stalk weight were equally close; (2) increasing N had a greater effect on clump weight than on number of millable stalks; (3) N increased clump weight by increasing weight per cane, the increase being greater in Co. 453 than in Co. 312; (4) main stalk length and clump weight were directly correlated; (5) number of stalks per clump and millable stalk length were negatively correlated; (6) partial correlations amongst the factors of mean length of main stalk, mean clump weight and number of stalks per clump indicated that increased stalk length is a complementary factor to tillering in increasing the clump weight, the contribution of stalk length being much less than that of number of stalks in the increase in weight of the clump; (7) there was a significant negative association between number of stalks and per cent sucrose in the juice, although this association became weaker as the cane matured.

1090. Baver, L. D., and others.
[Sugar-cane irrigation in Hawaii.]
Hawaii. Plant. Rec., 1954, **54**: 163-298, bibls, illus.

The whole of this number of the *Hawaiian Planters' Record* is devoted to a series of articles on irrigation in sugar cane plantations. The subjects include water resources and development, the economics of water development, the meteorological approach to irrigation, moisture tension in Hawaiian soils, the distribution of water in furrow irrigation, the different systems and their operation, flumes, and, abstracted separately below, the results of experiments on timing and on irrigation control with tensiometers and irrometers.

1091. Ewart, G. Y.
Background and results of recent irrigation timing tests in American Factors plantations.
Hawaii. Plant. Rec., 1954, **54**: 257-69, bibl. 16.

The tests were designed to compare irrigation control with Bouyoucos blocks and tensiometers with current plantation practice in timing irrigation rounds. It was concluded that the use of Bouyoucos blocks is a technique widely adaptable to sugar cane plantation conditions, and that for the soils of the experiment—the normal phase of low humic latosols—irrigating at 5,000 ohms is safe. This represents moisture replenishment when approximately two-thirds of the available supply has been used up.

1092. Waterhouse, A. D., and Clements, H. F.
Irrigation control with tensiometers and irrometers.
Hawaii. Plant. Rec., 1954, **54**: 271-83, bibl. 7, illus.

Irrigation was based on various tensiometer readings in experiments in sugar cane in 1953 on 3 soil types, namely, alluvial, grey hydromorphic and low humic latosol. The authors conclude that "the harvest results brought out the following points: (1) Significant losses in both cane and sugar yields can be expected when irrigations are applied at soil moisture tensions of 0·65 atm. or higher; (2) no gain in sugar yields can be expected by irrigating at higher tensions prior to the normal ripening period during the second season of growth; (3) there is a strong suggestion of a thesis not yet proven by statistical analysis that increased yields might be expected when irrigations are applied at soil moisture tensions as low as 0·15 atm." [See also *H.A.*, 24: 3222.]

1093. Pearson, C. H. O.
Cane yields and moisture. Results with overhead spray irrigation.
S. Afr. Sugar J., 1954, **38**: 515-19.

Comparisons between the yields of 2 successive crops of N: Co. 310 that had received no irrigation, spray irrigation and furrow irrigation suggest that, although furrow irrigation may produce a heavier yield of cane than no irrigation, the yield per inch of water (rain plus irrigation) is lower than that produced per inch of natural rainfall. Spray irrigation on the other hand appears able to produce an effect on both total yield of crop and in yield per inch of water that is superior to that of both rainfall and furrow irrigation.

1094. Willcox, O. W.
Evaluation of fertilizer tests. Part I. The scientific basis. Part II. Evaluation of a multiple test. Part III. The strip test.
Sugar, N. York, 1954, **49** (2): 46-8, 50; **49** (3): 51-6; **49** (4): 40-3.

Part I outlines the quantitative aspects of plant nutrition on which the rational use of fertilizers must be based. In agrobiology the essence of the law of diminishing increments of yield is embodied in the Mitscherlich-Baule yield equation and in the inverse yield-nitrogen law. Subsidiary formulae derived from the equation have been used in setting up the percentage yield diagram and the standard agrobiological yield diagram. These relieve the operator of much of the calculation that would otherwise be required. Part II gives an account of a 4–3–3 NPK factorial experiment replicated 4 times and thus involving the use of 144 plots. Part III stresses the difficulties of this classic method and describes the strip test, a simple but accurate modification, wherein for each separate fertilizer or fertilizer level, the plot arrangement involves the sandwiching of a long narrow fertilized strip between 2 similar unfertilized strips. For sugar cane the strips should be at least 200 feet long and each contain at least 400 stools.

1095. Owen, W. L.
Dewaxed retreated refinery filter press mud as a plant food and plant growth stimulant.
Sugar, N. York, 1954, **49** (3): 40-2, bibl. 11, illus.

The mud used in the experiments described was treated with carbon tetrachloride, thoroughly dewaxed, impregnated with an unspecified enrichment solution, reinoculated with the mixed microflora of a rich garden soil and finally treated with 2% carbon bisulphide. The heights of canes to the first node after 6 weeks' growth in treated and untreated mud and in pure sand respectively were 5·0–5·5, 3·5 and 3·0 in.—Wm. L. Owen Labs.

1096. Coury, T., Malavolta, E., and Ranzani, G.
As tortas de cacáu e de algodão na adubação da cana. **(Cacao meal and cotton seed meal as sugar-cane manures.)** [English summary 9 lines.]
An Esc. sup. Agric. "Luiz de Queiroz" Piracicaba, 1953, **10**: 31-5, bibl. 1.

In a trial on Co. 290 cotton seed meal containing 5·16% N and cacao bean meal (the residue following extraction of cocoa butter and theobromine) containing 2·34% N were applied in doses of unstated weight but equal cost. The cotton seed meal was more effective than the cacao bean meal whether this was applied alone or with added mineral fertilizer.

1097. Martínez, M. B., and Lugo-López, M. A.
Lack of residual influence from subsoil fertilization of a sugarcane plant crop upon the succeeding ratoon crop. [Spanish summary 11 lines.]
J. Agric. Univ. Puerto Rico, 1954, **38**: 123-7.

Data are presented here on sugar yields obtained with a ratoon crop growing on a heavy-claypan soil subjected to different tillage treatments some 28 months prior to the harvesting date. In a previous harvest—that of the original plant crop 14 months following treatments—significantly greater differences were measured favoring the plots which received half of the fertilizer on the subsoil over those receiving all the fertilizer on the topsoil [see *H.A.*, 23: 1327 and 2332]. However, the data herein reported for the following ratoon crop indicate no residual effect from the original subsoil fertilization which could be measured in terms of sugar yields. [Authors' summary.]

1098. Mohana Rao, N. V., and Narasimham, R. L.
Sugarcane ratoons.
Curr. Sci., 1954, **23**: 95, bibl. 5.

Three successive crops of Co. 419 received fertilizer at the rate of 100 lb. N per acre. Yields of cane and sugar were highest in the plant crop and lowest in the second ratoon crop. Increasing the N application to 150 lb. raised the yield of the first ratoon crop to that of the plant crop but produced no similar response in the second ratoon crop. Leaf and whole plant analyses showed that the plant crop absorbed more N during the growth phase than did the ratoons. Soil N tended to decline and organic carbon and K tended to increase under the ratoon crops. Earlier maturation of the ratoons appeared to be associated with lower hydration of the plant tissues. Full results are to be published elsewhere.—Sugarcane Res. Stat., Anakapalle.

1099. Schroo, H.
The use of pot tests in research on the fertility of sugar cane soils. Paper VI: The effect of increasing phosphate dressings and various methods of placement on the phosphate status of red ferruginous clay and on the growth of cane.
Trop. Agriculture Trin., 1954, **31**: 327-41, bibl. 7.

The data obtained prove that: (1) "phosphate fixation figures", as determined by certain chemical methods, are misleading when related to phosphate availability to plant roots; concentrated placement of phosphate dosages, which eliminates "phosphate fixation" greatly, proved to be less effective than the spreading of the same dosage through relatively large volumes of soil; (2) the response to any phosphate dressing below the optimal dosage depends on the concentration of that phosphate in the soil and on the contact area between absorbing root surface and phosphated soil particles. Therefore, adverse soil conditions necessitate a readjustment of the accepted adequate (Truog) phosphate status of the soil. [From author's summary. See also *H.A.*, 24: 4376 and earlier.]

1100. Lal, K. N., and Tandon, J. N.
Effect of Mg: Ca ratios on growth and sap characters of sugarcane.
Sci. and Cult., 1954, **20**: 147-8, bibl. 1.

The growth and physico-chemical properties of sugar cane at Mg/Ca ratios of 0·2, 0·5, 1·0, 2·0 and 5·0 were investigated in pot experiments. The optimum ratios were 0·2 for shoot height and root weight, 0·5 for dry leaf-trash weight, 1·0 for shoot number, leaf number and leaf weight, and 2·0 for millable cane weight. The optimum ratios are also given for the following characters of stem and leaf sap: density, surface tension, viscosity, osmotic pressure, solute concentration, electrical resistance, specific electrical conductivity, pH and electric potential.

1101. Jepson, W. F.
A critical review of the world literature on the lepidopterous stalk borers of tropical graminaceous crops.
Commonwealth Institute of Entomology, 41 Queen's Gate, London, S.W.7, 1954, pp. 127, bibl. pp. 10, 15s.

Sugar cane is almost universally afflicted by moth borers, and most people will agree with the author when, in his opening remarks, he describes the problems they present as chronic, serious and often discouraging. The primary purpose of the present work is to provide those concerned with control measures with a balanced picture of the information culled from world literature.

The review is divided into 8 sections covering, in turn, historical aspects, the borer species and their systematic characters, their host-range and economic host-plants, their bionomics, the estimation of populations and damage caused, the relationship between infestation and cultural practices, the parasites, predators and diseases of borers, and their control by cultural, biological and chemical means. Finally there is a most useful general assessment of the knowledge already gained on the different aspects of the problem together with recommendations on future lines of research.

1102. Narasimha Rao, G.
"Galls" on *Saccharum spontaneum* L.
Curr. Sci., 1954, **23**: 29, bibl. 2, illus.

The occurrence of "galls" in the form of "bunchy tops" in two forms of *S. spontaneum* was found to be associated with the presence of pupae of an unidentified dipterous insect. This is thought to be the first record of injury of this sort occurring on a *Saccharum* species. —Sugarcane Breed. Inst., Coimbatore.

1103. Agarwala, S. B. D., and Prasad, R. N.
Trials with Pestox-3H on sugarcane scales.
Curr. Sci., 1954, **23**: 132-3, bibl. 1.

Pestox, applied as a 0·5% spray, produced a significant reduction of scales, *Trionymus sacchari*, on 3 varieties of sugar cane.

1104. Agarwala, S. B. D., Naqvi, S. Z. H., and Singh, R. P.
Aldrin and dieldrin for termite control.
Curr. Sci., 1954, **23**: 131-2.

Aldrin and dieldrin applied to sugar cane setts at planting gave considerably better control of 2 species of termite, *Microtermes obesi* and *Odontotermes assmuthi*, than BHC or DDT.

1105. ALEXANDER, J. B.
Starch in Natal cane sugar. Results of preliminary investigations.
S. Afr. Sugar J., 1954, **38**: 617-23, bibl. 5.

The starch contents of the following Natal sugar products are given: juice, syrups, government and raw sugars, mill white sugars, refined sugars and molasses. The amounts of starch present were appreciable.

Tea.

(*See also* 428, 1132o, t, 1133j, k, t, w, 1146, 1150.)

1106. TEA RESEARCH INSTITUTE OF CEYLON.
Annual Report of the Tea Research Institute of Ceylon for the year 1953, 1954, pp. 59, being *Bull.* **35.**

Chemistry: Nutrition and soil studies; minor element nutrition with zinc, molybdenum and manganese; withering, rolling and stalk extraction. *Physiology:* Selection and vegetative propagation; green manures including ground covers, bush plants and shade trees; weed killers; soil conditioners; manurial and other field experiments. *Pathology:* Blister blight research including spraying, fish leaf plucking plus spraying, dusting, mist-blowing. *Mycology: Cercosporella* disease; *Ganoderma* root disease; *Acacia elata* disease; *Amphichaeta* disease of *Grevillea* seedlings; tea mycorrhiza.

1107. TEA RESEARCH INSTITUTE OF EAST AFRICA.
Annual Report of the Tea Research Institute of East Africa 1953, 1954, pp. 44.

Agricultural Department. Manuring: Artificial manures were again ineffective except at one station where nitrogen gave a significant response; at another station mulch increased yields by just under 100 lb. per acre. The control of sulphur deficiency has been further studied at Tukuyu by application of elementary sulphur or sulphate of ammonia; data suggest that the sulphur requirements of tea yielding 1,000 lb. per acre are about 5 lb. [See separate abstracts on the establishment of tea from cuttings, weedkillers and vegetative propagation.] *Chemical Department.* Chemistry of tea leaf: total oxidizable matter, enzyme activity, distribution of leaf material in the flush, copper content, distribution of copper in the flush. Fermentation.

1108. INDIAN TEA ASSOCIATION, TOCKLAI.
Annual Report of the Indian Tea Association, Scientific Department, Tocklai Experimental Station, for 1953, 1954, pp. 158.

Agricultural Branch: [see next abstract]. *Botanical Branch:* Vegetative propagation (pretreatment and packing of cuttings), growth and yield (leaf area and leaf dry weight), effect of phosphate, agrotype index, phloem index, and quality (leaf hair and its relation to other attributes of tea). *Biochemical Branch:* Volatile constituents of tea, chemical changes in withering, and experimental withering. *Physico-chemical Branch:* Soil and climate studies. *Entomological Branch:* Control of red spider, termites and other pests (including successful control of the adult, quiescent and egg stages of red spider with Aramite), and taints from insecticides. *Mycological Branch:* Effect of waterlogging on *Albizzia odoratissima*, control of black rot, red rust and eelworms, *Nectria* inoculation experiments, and effects of seed dressings on seeds of *Crotalaria anagyroides* and *Tephrosia candida*. *Advisory Branch:* Trials on manuring, shading, plucking, sprayers and spraying, dusting, selective weedkillers and vegetative propagation. *Engineering Department:* Experimental withering chamber, rolling machinery, and mechanical harvesting with Tarpen croppers.

1109. INDIAN TEA ASSOCIATION, TOCKLAI.
Agricultural Branch.
A.R. Indian Tea Ass., sci. Dep., Tocklai, 1953, 1954, pp. 7-34.

A summary follows of the results of experiments mainly concerned with various aspects of shading. *Effect of different nitrogenous manures at different light intensities.* In the first year of treatment the average yield from 4 different manures was 34% greater under 70% light than under full light but no greater under 50% than under 70% light. *Effects of different species and heights of shade trees on light intensity and yield of tea.* The average effect for 7 different shade tree species was that for each foot increase in height of tree yield of tea increased by 1·55 lb. green leaf per plot of 108 bushes and light intensity in the plot increased by 15 f.-c. *Effects of different light intensities on yield of tea.* In this small experiment the optimum yield was obtained within a light intensity range of 1,181–2,200 f.-c., i.e. 33–60% light. *Effects of different species of shade trees, and nitrogen, phosphate and potash.* (1) *Albizzia stipulata* (both the red- and the green-stipuled) and *A. odoratissima* were the most efficient of the seven species tested. (2) Benefit from sulphate of ammonia remained till the year after application in both shaded and unshaded plots and to some extent for a further year under an efficient shade tree. (3) Phosphate and/or potash had no significant effect on yield. *Potting medium.* In experiments the best medium was a mixture of 7 parts by volume of subsoil, 3 of coconut fibre and 2 of sharp sand plus 5 lb. fertilizer base per cu. yd., the base consisting of 2 parts by weight of hoof and horn meal, 2 of ordinary superphosphate and 1 of sulphate of potash. After 9 months in the pot this medium gave plants which were 99% taller than the controls and 55% taller than the average of other treatments. *Effect of nitrogen under shade and of shade on the characters and valuation of made tea.* Nitrogen under shade had a slightly adverse and shade alone a slightly beneficial effect on quality, but in neither case was the effect large enough to affect the ultimate value of the made teas.

1110. EDEN, T.
Vegetative propagation.
A.R. Tea Res. Inst. E. Afr. 1953, 1954, pp. 23-9.

In further experiments with cuttings the effects of a quick dip and a 24-hour soak in a variety of growth substances were compared. Compared with soak and control the dip gave equal survival, better rooting and better shooting with each of the following substances: alpha-(2-chlorophenoxy)-*n*-butyric acid, alpha-(2-methyl-4-chlorophenoxy)propionic acid, Seradix B and alpha-(2-chlorophenoxy)propionic acid. Planting out under unsatisfactory environmental conditions vitiated the good effects of the growth substances.

1111. Eden, T.
The establishment of tea from cuttings.
A.R. Tea Res. Inst. E. Afr. 1953, 1954, pp. 19-20.

In their 3rd year bushes originating from cuttings are as vigorous and drought-resistant as those from nursery stumps. The main difficulty in the field planting of vegetatively propagated plants lies in their not having a taproot as a storage organ. A trial was made with old vegetatively propagated material to determine whether this problem could be overcome by allowing such plants to develop in the nursery until their lateral roots are large enough to function as storage organs and then treating them like normal nursery plants. Two lots of material were used, 3½-year plants stumped just before planting out, and 4½-year plants stumped at 3½ years old, allowed to regenerate and then stumped again just before planting out. The once-stumped plants gave significantly the better results, casualties being 1% compared with 19%. It was concluded that vegetatively propagated plants can be used and treated in the same way as ordinary nursery stock.

1112. Nezgovorov, L. A., and Kotovič, G. M.
The growth of tea seedlings under biological acidification of soil. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1953, **90**: 929-32, bibl. 4.

When in pot trials S was added to the soil, the growth of tea seedlings greatly improved, although the soil pH was only reduced from 7 to 6·6.

1113. Wight, W., and Barua, D. N.
Calcium oxalate crystals as an indicator of nutrient balance in the tea plant (*Camellia sinensis*).
Curr. Sci., 1954, **23**: 78-9, bibl. 4.

Investigations have shown that the number of calcium oxalate crystals in the phloem parenchyma of the tea leaf petiole is notably constant for a particular phenotype or clone and is not appreciably influenced by minor variations in cultural conditions. The number of calcium oxalate crystals counted under standardized conditions has been called the "phloem index". A close linear relationship has been found between the phloem index and the K_2O: P_2O_5 ratio in the leaf. In a number of field populations (*jats* or provenances), each raised from a distinct seed source, a positive correlation has been found between the mean phloem index of the population and subsequent meristic growth based on the number of shoots removed in one year by plucking. There is some evidence that an increase in meristic growth accompanied by an increase in phloem index and therefore of Ca uptake results in a decrease in the uptake of K; for the relationship between phloem index and K_2O: P_2O_5 ratio to hold good this must indicate an even greater fall in leaf P. The mean phloem index has also been determined for 12 populations of tea plants each raised from a different commercial source of seed; each population has been grown in full sunlight and under shade and with no N and 100 lb. N as sulphate of ammonia. Each population was characterized by a specific phloem index. Light intensity and N together, but not separately, were found to interact with provenance to cause an alteration in the phloem index.—Tocklai exp. Stat.

1114. Eden, T.
Morphological basis of quality in tea.
Nature, 1954, **174**: 844, bibl. 1.

A statistical re-examination of the data of Wight and Barua [*H.A.*, 24: 3243] indicates that, while the correlation between taster's valuation and leaf hairiness is suggestive, it does not justify the statement that "hair can be taken as a reliable index of quality".

1115. Child, R.
The chemistry of the tea leaf in relation to manufacture.
Pamphl. Tea Res. Inst. E. Afr. **8**, 1954, pp. 9-16.

The structure of tea leaf, its cell wall substances, protoplasm constituents, pigments, enzymes, cell sap constituents, and fermentation are discussed. A typical "dissection" experiment in which different parts of the flush were separately analysed in connexion with standard of plucking showed (1) that the 3rd leaf is poor in catechins and enzyme activity and, since it constitutes more than a third of the total weight, has a marked effect on the composition of the whole flush; and (2) that stalk has a high enzyme activity but a low catechin content.

1116. Zaprometov, M. N.
The initial formation of catechins in the tea plant. [Russian.]
Biohimija, 1954, **19**: 599-609, bibl. 32.

In 20- to 25-day-old tea seedlings only the simple forms of catechins, namely *l*-epicatechin and *d,l*-catechin, were found, but in 60- to 70-day-old plants all the catechins characteristic of mature plants were present.

1117. Lebedev, G. V.
Effect of irrigation on the tannin composition of Azerbaĭdžan tea. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **96**: 1257-9, bibl. 9, illus.

From results presented it is concluded that irrigation can increase tea yields appreciably without detriment to quality. In Azerbaĭdžan tea the highest content of catechins, and particularly of *l*-epicatechingallat, was found at the end of June, while in tea from Georgia and some other regions the maximum was reached later in the season. In all tea growing areas the catechin contents were lower in the spring and autumn than during the summer.

1118. Fay, B. D.
A preliminary report on the commercial experiment of mechanical harvesting of tea on Dickwella estate.
Tea Quart., 1954, **25**: 3-7, bibl. 1.

An account is given of experiments in 1952 and 1953 on mechanical harvesting with Tarpen knapsack croppers. With experience, the cost of machine plucking has been reduced to 24·00 cts per lb., although this figure does not include any allowance for depreciation or repairs. The accurate slope plucking and increased spread of bush obtained with mechanization have reduced wind damage and weed growth and facilitated control of blister blight. Yields from hand and machine plucking were not significantly different.

1119. GOODCHILD, N. A.
The causes of dieback in tea.
Pamphl. Tea Res. Inst. E. Afr. **8**, 1954, pp. 24-9.

Dieback is one of the more important causes of crop loss in East Africa. Non-pathological dieback may be due to carbohydrate deficiency, over-plucking, damage caused in removing couch grass, sun scorch after pruning, and hail. Pathological dieback may be due to *Helopeltis* or to fungi including *Aglaeospora aculeata*.

1120. WEBSTER, B. N.
Notes on pathological matters.
Tea Quart., 1954, **25**: 17-19, bibl. 4, illus.

The cercosporella disease (*Calonectria theae*). Recent investigations into a "corroded flush" symptom on tea in plucking, formerly attributed to the "Cercosporella" disease, have shown a capsid bug, *Lygus viridanus*, to be responsible. A single spray application of 50% DDT dispersible powder at a rate of 2 lb. to 30–50 gal. of water per acre has resulted in 60–80% control for a period of 3 months. Owing to increase in mite population after DDT spraying, however, control by shortening the plucking rounds to 10 days or less to ensure removal of unhatched *Lygus* eggs is preferable. *Grevillea seedling disease* (*Amphichaeta grevilleae*). Of the various fungicides tried dithane gave the best results, and 50% copper fungicides at 0·5% concentration gave fair control. The use of covers to protect seed beds from damage caused by heavy rain is also suggested.

1121. LOOS, C. A.
Studies in blister blight control. XIII. Methods of fungicidal application in the control of the blister blight disease of tea.
Tea Quart., 1954, **25**: 29-37, bibl. 1.

Experiments with knapsack spraying, dusting and mist-blowing are described. Six cost estimations are set out in detail showing a cost range of 6·3 to 14·15 cts per lb. made tea for an assumed crop of 750 lb. per acre per annum.

1122. LOOS, C. A.
Studies in blister blight control. XIV. Further studies on the evaluation of some copper fungicidal dusts in the control of blister blight. XV. "Blidust" trials under north-east monsoonal conditions in Uva.
Tea Quart., 1954, **25**: 10-12, bibl. 1, 13-14, bibl. 1.

All 5 formulations used in trials in the south-west monsoon gave adequate protection at 5 lb. per acre at 5-day intervals, Blidust and Perecloud being superior to Strawson's Copper Dust, C.C.C. dust and Cuprosana. Blidust and Perecloud gave adequate protection at 5 lb. per acre at 10-day intervals. Perenox at 6 oz. per 15 gal. water per acre every 10 days, with which these dusts were compared, gave excellent results, affording almost complete control of the disease. In trials in the north-east monsoon Blidust at 5 lb. per acre at 8-day intervals gave good, and Blitox spray at 6 oz. per 15 gal. water per acre at 8-day intervals excellent, results. The combined results of these 2 experiments suggest that under all conditions except prolonged rain and mist Blidust affords a degree of protection comparable with that given by spraying.

1123. LAMB, J.
Studies in blister blight control. XVI. Conclusion.
Tea Quart., 1954, **25**: 38-40, bibl. 1.

The following are conclusions drawn by the Director of the Ceylon Tea Research Institute from a series of papers on blister blight control, abstracts of which have appeared in recent issues of *H.A.* Pressure-retaining knapsacks with a suitable nozzle such as the American double swivel nozzle and two OC-02 jets, spraying a suspension of 4 oz. of 50% copper fungicide in 10 gal. of water at the rate of approximately 15 gal. per acre are highly satisfactory. The efficiency of a battery of these knapsacks is greatly improved by a central power charging unit. For shorter term protection, hand dusting, particularly with the more efficient dusts which give adequate protection when used at the rate of 5 lb. every 8 days, has certain advantages, and may also be regarded as a useful complement to wet spraying. The Institute does not, however, recommend dusting for protection of areas subject to prolonged attacks of blister blight. Mist blowing is less certain as it is feared that the disadvantage of the complicated nature of the equipment, especially when used by estate labour, will tend to outweigh the advantages of ultra-low-volume coverage and comparatively high acreage per labourer.

1124. S[ARMAH], K. C.
Blister blight.
Ser. Tea Res. Inst. Tocklai **62/1,** 1954, pp. 11.

Points covered in this advisory leaflet include method and season of infection, conditions favouring the disease, effects of the disease, and control (preventive measures, autumn and spring treatment with copper fungicides, methods of spraying). This serial replaces No. 62.

1125. RANAWEERA, D. J. W.
A note on yellow mite of tea.
Tea Quart., 1954, **25**: 20.

Tea yellow mite (*Hemitarsonemus latus*) can be controlled on tea in plucking by 2–3 rounds of fish leaf plucking at fairly close intervals or, in tea recovering from pruning or not in plucking, by a sulphur spray at 1 lb. per 45 gal. water followed, if necessary, by a second application 1 week later.

1126. CHAKRABARTY, S. R., AND CHAKRABARTY, M. M.
The composition of Indian tea seed oils.
Sci. and Cult., 1954, **20**: 186-7, bibl. 6.

Spectrophotometric analytical data of tea seed oils (*Thea sasanqua*) from Darjeeling and Assam are given. The oil resembles groundnut oil.

Sundry crops.

(*See also* 1132a, d, r, v, 1133g, h, u.)

1127. SINGH, K. K., AND MATHUR, P. B.
A note on the cold storage of sapotas (*Achras sapota*).
Indian J. agric. Sci., 1954, **24**: 149-50, bibl. 7.

Fully grown hard sapodillas were stored at 4 temperatures between 35° and 55° F. with 85–90% R.H. and also at room temperatures. Weight losses were least at the lowest temperature. Total soluble solids increased and ascorbic acid decreased at all temperatures. Total acidity first decreased and then increased at all temperatures. Best storage conditions were 35–38° F. and 85–90% R.H. Storage life was about 8 weeks and post-storage life 3–5 days.

1128. Purss, G. S.
The fruit rots of the custard apple.
Qd J. agric. Sci., 1953, **10**: 247-65, bibl. 8, illus.

The symptoms are described of 3 fruit rots of custard apples, *Annona squamosa*, which occur in southern Queensland, particularly under conditions of high rainfall. *Phomopsis anonacearum* was isolated from fruit affected with black canker, and, although pathogenicity tests were inconclusive, it is considered that the fungus is responsible for the disease and also for a marginal leaf scorch. *Phytophthora palmivora* was found to be responsible for purple blotch and *Botryodiplodia theobromae* for diplodia rot. Control by spraying is likely to prove difficult owing to the size of the trees and because the foliage tends to hide the fruit, and would in any case rarely be justified economically. It is suggested that the removal of dead wood and mummified fruits should minimize the incidence of these diseases.

1129. Lewis, Y. S., Dwarakanath, C. T., and Johar, D. S.
Acids and sugars in the "Kamrakh" fruit, *Averrhoa carambola* Linn.
Curr. Sci., 1954, **23**: 54-5, bibl. 8.

Ripe fruits of the sweet form of carambola contain both oxalic acid (0·16%) and malic acid (0·06%), whereas fruits of the sour form contain only oxalic acid in quantities ranging from 1·0% in unripe fruits to 0·51% in ripe. Sugars present in both types consist largely of glucose with moderate quantities of fructose and traces of sucrose.—Centr. Food Tech. Res. Inst., Mysore.

1130. Schroeder, C. A.
Fruit morphology and anatomy in the white sapote.
Bot. Gaz., 1954, **115**: 248-54, bibl. 6, illus.

Anatomical details are presented of the vascular system, mesocarp, rind and endocarp of the fruit of the white sapote, *Casimiroa edulis*. The general morphological features of the fruit indicate that it should be classified as a special type of drupe. Basically, the fruit consists of 5 carpels, the inner portion of each developing into a hard sclerenchymatous endocarp within which is the single ovule.—Univ. Calif., Los Angeles.

1131. de la Cruz, S. T., and Gonzalez, L. G.
Cleft-grafting lanzones, *Lansium domesticum*.
Philipp. Agric., 1953, **37**: 295-300, bibl. 6, illus.

Trials were made on grafting 1- and 2-year-old *Lansium* seedlings, using 3 methods of scion preparation and 3 covering materials. Results 3 months after grafting showed that the average take of all scions on 1-year-old stocks was 18·9% and on 2-year-old stocks 20·6%. Scions defoliated 1 month before grafting did no better than leafy scions. Treating the scions with 1,000 p.p.m. IAA proved detrimental. Banana petiole was the most practical covering material.

Noted.

1132.

a Aggarwal, J. S.
La noix et le baume de cajou. **(The cashew nut and its shell oil.)**
Oléagineux, 1954, **9**: 559-64, bibl. 49, illus.
A review.

b Anon.
El cultivo del cacaotero en el Región Central. **(Cacao growing in the Central Region [of Venezuela].)**
Agric. venezol., 1953, **18** (165): 28-33, illus.

c Anon.
Controlled sugar cane breeding.
Sugar, N. York, 1954, **49** (3): 43, illus.
By regulating day-length.

d Anon.
Jaman seed as cattle feed.
Indian Fmg, 1954, **4** (3): 10-11.
Seeds of *Eugenia jambolana* are rich in protein.

e Anon.
Sugar schools of the world. Tucumán National University, Argentina.
Int. Sugar J., 1954, **56**: 74.

f Bonner, J., Parker, M. W., and Montermoso, J. C.
Biosynthesis of rubber.
Science, 1954, **120**: 549-51, bibl. 21.
A review.

g Braudeau, J., and Burle, L.
Le cacao. Sa production en Équateur, Colombie et au Costa-Rica. **(Cacao growing in Ecuador, Colombia and Costa Rica.)**
Bull. agron. Minist. France Outre-mer **9,** 1954, pp. 60, bibl. 24, illus.
Cultural practices and research.

h Bregger, T.
A brief summary of sugar cane breeding in Florida—1930-1953.
Proc. Soil Sci. Soc. Fla 1953, 1954, **13**: 60-3, bibl. 4.

i Brett, P. G. C.
***Saccharum-Miscanthidium* hybrids.**
J. Genet., 1954, **52**: 542-6, bibl. 14, illus.
Hybrids useful for breeding but not commercially.

j Calman, W.
South African sugar industry.
Quart. Rev. agric. Econ., 1954, **7**: 135-8.
Economics and future prospects.

k van Dillewijn, C.
Cane culture in Panama.
Sugar J., 1954, **17** (3): 14, 16-17, bibl. 2.

l van Dillewijn, C.
Sugar cane in Costa Rica.
Sugar, N. York, 1954, **49** (4): 29-31, illus.

m van Dillewijn, C.
Sugar cane in Venezuela.
Sugar, N. York, 1954, **49** (6): 35-7, bibl. 3, map.

n Dunn, G. S.
Annual Report of the Senior Entomologist, Department of Agriculture, Stock and Fisheries, 1952/53.
Papua New Guinea agric. Gaz., 1954, **8** (3): 18-27.
Including cacao capsids and *Oryctes* and *Sexava* spp. on coconut and their control.

o Eden, T.
The establishment of young tea.
Pamphl. Tea Res. Inst. E. Afr. **9**, 1954, pp. 10.
Planting material, holing and planting, and frame formation.

p Fanshawe, D. B.
The vegetation of sugar-cane flood fallows.
J. Ecol., 1954, **42**: 211-17.
Swamp and aquatic species in British Guiana.

q Guilbeau, W. F., Lipps, J. G., Jr., and Martin, L. F.
Clarification of new varieties of cane on a pilot plant scale.
J. agric. Food Chem., 1954, **2**: 941-6, bibl. 10.
See also *H.A.*, 23: 1325 and 4703.

r Harrington, F. B.
The jaboticaba.
Fmr's Wkly, S. Afr., January 20, 1954, p. 59, illus.
Myrciaria cauliflora promising for frost free areas of South Africa.

s Hauck, F. W.
Some observations on the manuring of bananas.
J. agric. Soc. Trin. Tob., 1954, **54**: 43-9.
A useful review, though lacking a bibliography.

t Heaton, G. L.
Notes on *Stylosanthes gracilis* (Brazilian lucerne) as a ground cover for tea.
Tea Quart., 1954, **25**: 8-9.

u Hinman, F. G.
Screening tests of compounds as fumigants for eggs and larvae of the oriental fruit fly.
J. econ. Ent., 1954, **47**: 549-56, bibl. 4.
For earlier trials see *H.A.*, 22: 1860.

v Indian Central Arecanut Committee.
Broad hints on arecanut cultivation.
Mysore agric. Calendar 1954, 1954, pp. 10-15.

w Indian Central Coconut Committee.
Coconut cultivation in Mysore State.
Mysore agric. Calendar 1954, 1954, pp. 3-10.
In dry, riparian and irrigated areas.

x Jacques-Félix, H.
Les problèmes actuelles de la caféiculture en Afrique. (**Present problems in coffee growing in Africa.**)
J. Agric. trop. Bot. appl., 1954, **1**: 118-22.
Soil impoverishment and fungal diseases.

y King, N. J.
The implications of ratoon stunting disease.
Int. Sugar J., 1954, **56**: 125-7, illus.
A review.

z Langford, M. H., and others.
Hevea diseases of the western hemisphere.
Plant Dis. Reptr, 1954, *Suppl.* **225**, pp. 37-41.
Diseases discussed, but control not mentioned.

1133.

a Manis, W. E.
Phytophthora leaf fall and dieback.
Plant Dis. Reptr, 1954, *Suppl.* **225**, pp. 49-52.
Phytophthora palmivora phenomena on rubber.

b Marar, M. M. K.
Cover crops for coconut plantations.
Bull. Indian Centr. Coconut Cttee, 1954, **8**: 58-9.
Pueraria phaseoloides and *Calopogonium mucunoides.*

c Mauritius.
Summary of the regulations relating to the restrictions on the importation into Mauritius and the Dependencies of plants, animals and animal products.
Bull. Dep. Agric. Mauritius **88**, 1953, pp. 8, 25 c.

d Moutia, L. A.
Notes sur le cycle biologique de trois lépidoptères nuisibles à la canne à sucre à Maurice. (**Notes on the life history of 3 lepidoptera injurious to sugar cane in Mauritius.**)
Rev. agric. Maurice, 1954, **33**: 116-22, bibl. 1.
Proceras sacchariphagus, *Sesamia calamistis* and *Argyroploce schistaceana.*

e Narasimhan, M. J.
Malformation of panicles in mango incited by a species of *Eriophyes*.
Curr. Sci., 1954, **23**: 297-8, bibl. 1, illus.

f Newsam, A.
***Fomes lignosus* in replanted areas.**
Quart. Circ. Ceylon Rubb. Res. Inst., 1953 (issued 1954), **29** (3/4): 78-83.
A general account of Malayan control methods.

g Paul, V. J., and Yeddanapalli, L. M.
Olefinic nature of anacardic acid from Indian cashew-nut shell liquid.
Nature, 1954, **174**: 604, bibl. 5.

h Revappa, B. A.
Arecanut cultivation in Chitaldrug Taluk.
Mysore agric. Calendar 1954, 1954, pp. 165-8.
Including costs and returns.

i Santini, R., Jr.
Phosphorus content of pineapple juice.
J. Agric. Univ. Puerto Rico, 1954, **38**: 147, bibl. 1.

j S[armah], K. C.
Brown blight and grey blight [of tea].
Ser. Tea Res. Inst. Tocklai **63/1,** 1954, pp. 2.
Colletotrichum camelliae and *Pestalozzia theae* and their control.

k S[armah], K. C.
"Damping off" disease of young tea seedlings.
Ser. Tea Res. Inst. Tocklai **101,** 1954, pp. 2.
Pythium and its control.

l Sharma, S. L., Rao, D., and Jha, H. C.
***Centranthera nepalensis* Don, a new root parasite.**
Curr. Sci., 1954, **23**: 128, bibl. 6.
C. nepalensis (Orobanchaceae) on sugar cane and grasses.

m Shaw, H. R.
Irrigation methods for sugar cane. I. Contour furrow methods. II. Graded furrow methods. III. Overhead sprinkling irrigation.
Sugar, N. York, 1954, **49** (3): 32-6, bibl. 8, illus.; **49** (5): 34-42, bibl. 14, illus.; **49** (6): 44-7, bibl. 8, illus.
A review of modern methods.

n Simmonds, N. W.
Isolation in *Musa*, sections Eumusa and Rhodochlamys.
Evolution, 1954, **8**: 65-74, bibl. 10.

o Singh, S. M.
***Rhynchaenus mangiferae*, a serious mango pest in the Uttar Pradesh.**
Curr. Sci., 1954, **23**: 270-1, bibl. 2.
A weevil belonging to the Curculionidae.

p Stahel, G.
Die Siebröhrenkrankheit (Phloëmnekrose, Flagellatose) des Kaffeebaumes. **(Sieve tube disease (phloem necrosis, flagellatosis) of coffee trees.)**
Neth. J. agric. Sci., 1954, **2**: 260-4, bibl. 7.
A review of work done in the thirties.

q Staub, S.
The determination of the phosphate content of sugarcane juices.
Rev. agric. Maurice, 1954, **33**: 175-7, bibl. 1.
The Atkins and Farnell method.

r Subrahmanyan, V., and others.
Standards for Indian coffee.
Curr. Sci., 1954, **23**: 292-3, bibl. 6.
Based on samples of arabica and robusta coffees.

s Trivelin, A. P.
Tancagem de cacau como alimento para pinto. **(Cacao tankage as poultry feed.)** [English summary 13 lines.]
Rev. Agric. Piracicaba, 1954, **29**: 223-31, bibl. 5.
The residue after removal of cocoa butter and theobromine.

t UPASI Scientific Department.
Some notes on the establishment of dadap (*Erythrina lithosperma*).
Adv. Leafl. UPASI sci. Dep. **4,** reprinted in *Plant. Chron.*, 1954, **49**: 398-9.
As a shade tree for tea.

u White, E. V.
The constitution of sapote gum. III. A structural evaluation.
J. Amer. chem. Soc., 1954, **76**: 4906-9, bibl. 14.
From *Achras sapota.* For Parts I and II see *H.A.*, 23: 3626 and 24: 1017w.

v Williams, J. R., and Mamet, R.
Insects and other invertebrates which feed upon sugarcane in Mauritius and Réunion, and their natural enemies.
Bull. Mauritius Dep. Agric. **89,** 1954, pp. 19, bibl. 73.

w W[ood], D. J., and T[rinick], J. M.
Miniature manufacture of leaf from single bushes.
Ser. Tea Res. Inst. Tocklai **102,** 1954, pp. 5, diagrams.

x Young, H. E.
Pink disease.
Adv. Circ. Rubb. Res. Inst. Ceylon **41,** 1954, pp. 4, illus.
Symptoms, dissemination, damage and control of *Corticium salmonicolor* on rubber.

NOTES ON BOOKS AND REPORTS.

Books.

1134. BARNES, A. T.
The dahlia grower's treasury.
Collingridge, London, 1954, 9×5½ in., pp. 160, illus., 15s.

Out of his long experience of dahlia growing Mr. A. T. Barnes has written a most valuable work, valuable not only for its detailed information on the culture of the dahlia, but also because it contains much sound general information which may be applied to the growing of other plants. This book is packed with a wealth of detail which could be furnished only by one who has first hand knowledge of the work involved in the raising, growing and exhibiting of perfect blooms.

In the first chapter Mr. Barnes outlines the history and evolution of the dahlia as far as it can be traced; this, as with so many well known flowers that have been in cultivation for hundreds of years, must remain in the realm of speculation. Methods of propagation, planting, cultivation and storage of the tubers are then discussed in considerable detail. There is a useful chapter on dahlia pests and diseases, and the measures of control are noted in each case. The author's interest in exhibiting is evident throughout the book; very frequent reference is made to the cultivation of dahlias for show, and two chapters are devoted to the growing and preparation of flowers for exhibition. Mrs. Barnes has contributed a most interesting chapter on the use of dahlias in flower arrangement.

The multitude of dahlia varieties exhibited at the autumn shows is bewildering, and intending growers will welcome the selected list which Mr. Barnes includes at the end of the book. In this he describes chosen varieties and classifies them, giving their bad as well as their good points. It would be useful if such a list could be revised from time to time and published separately from the book, as undoubtedly there will be many additions and omissions needed in future years.

A monthly calendar of operations is given, the book is well indexed, and the paragraph headings are in heavy type; with the help of these it is a simple matter to find information on a particular point with a minimum of trouble. The book is well illustrated with clear photographs and diagrams, although it is to be regretted that the former do not carry reference numbers, as they do not always occur opposite the text to which they refer.

Both the newcomer to the art of dahlia growing and the fully experienced grower can learn a great deal from this book, and can hardly fail to be inspired by the author's enthusiasm. M.P.

1135. BECKER-DILLINGEN, J., AND OTHERS.
Festschrift aus Anlass des 150 jährigen Bestehens der Staatlichen Lehr- und Forschungsanstalt für Gartenbau in Weihenstephan 1804-1954. **(Commemorative volume in honour of the 150th anniversary of the Horticultural College and Research Station at Weihenstephan 1804-1954.)**
Bayerischer Landwirtschaftsverlag, Munich, 1954, 9½×7 in., pp. 212, bibls, illus.

This commemorative volume is introduced by J. Becker-Dillingen, Director since 1945, who traces in detail the history of the institute from its foundation in 1804 to the present time (1954). Three reports by Heads of Sections follow, discussing the lines of research pursued since the end of the war: (1) *R. V. Hösslin, Institute of Vegetable Culture* (pp. 91-120, bibl. 36), deals with root studies, rotations, the raising of plants, spacing, variety trials, machines and equipment, harvesting late vegetables, marketing vegetables. (2) *F. Penningsfeld, Institute of Soil Science and Plant Nutrition* (pp. 121-93, bibl. 51), describes work on the respiration of soil organisms, soil structures, horticultural soils, peat as a growing medium, composting and soil sterilization, water supply, nutrient requirements and optimum fertilizer applications, hydroponics, heating and aeration, supply of CO_2, artificial light, methods of fertilizer application, manuring and quality, manuring with town waste. (3) *R. Hansen, Institute of Perennial Ornamentals, Woody Ornamentals and Applied Plant Sociology*, pp. 195-212.

1136. BOUYCHOU, J. G. (Editor).
Manuel du planteur d'hévéa. Tome I. Culture—exploitation. **(Rubber planters' manual. Vol. I. Culture and exploitation.)**
Institut Français du Caoutchouc and Institut des Recherches sur le Caoutchouc en Indochine, 1954, 11×8½ in., pp. 151, bibl. 23, illus., loose-leaf wire bound 1,150 fr.

This stencilled publication, edited by the Director of the Institute, is a provisional new edition of the first part of *Le caoutchouc d'hévéa—initiations aux méthodes d'exploitation en Indochine* by J. Le Conte, H. Regnault and G. Colin, published by the Institute in 1945 and now out of print, and contains much material from M. Ferrand's *Phytotechnie de l'hévéa.* Further volumes are to be published on experimental work and on processing and the industrial uses of rubber. The present volume consists of five chapters: (*a*) the laticiferous system and the latex (pp. 9); (*b*) the biology of *Hevea brasiliensis* (pp. 15) including taxonomy, floral biology, bark anatomy, and physiology; (*c*) exploitation (pp. 74) including the factors governing the establishment of a plantation, culture, maintenance, tapping, diseases; (*d*) breeding (pp. 28); and (*e*) other rubber plants (pp. 9). There are 159 figures which include diagrams, adequately reproduced photographs, good black-and-white drawings and a coloured plate of leaves showing the symptoms of different diseases.

1137. BRITISH COMMONWEALTH SCIENTIFIC CONFERENCE (CONNELL, V.).
The application of results of research.
Butterworth Sci. Publ., Lond., 1954, 8½×5½ in., pp. 212, 21s.

"So I invite all of you . . . to assist us to get out of the pigeon-hole ideas . . . to which we are all so subject—of receiving something of immense value from some scientific body . . . and putting it on the file. . . . The real business of the organization of scientific research is . . . getting the results of the work done to the people who must first of all understand those results. These, in their turn, can translate it into something which the laity can understand. Having thus been translated it can go into the service of the people who most need it."

Thus the Rt Hon. R. G. Menzies in his opening address to the British Commonwealth Scientific Conference held in Australia in February-March 1952.

In determining the best methods of bringing this wholly desirable state of affairs into being a survey of the network of organizations which at present attempt to do so in the different Commonwealth countries is a useful, even necessary, preliminary. Such a survey is presented in this book and agricultural research receives its full share of attention.

The first five sections, pp. 1-41, covering introduction, conventional methods, special methods, obstacles to the use of information and conclusions, all make interesting reading. They are followed by very much larger appendixes, which deal in turn with the relevant organizations in being in the U.K., Canada, Australia, New Zealand, South Africa, India, Ceylon and Southern Rhodesia. Finally a chapter is devoted to some novel methods used in the U.S.A., particularly by the Tennessee Valley Authority.

Quite apart from the particular object in view the student of agricultural progress will welcome the clear accounts of agricultural organization in different countries. D.A.

1138. van Cauwenberghe, E., and others.
Fruits: Their characters and qualities.
[English edition, translator Rowe-Dutton, P.]
Office National des Débouchés Agricoles et Horticoles, Brussels, 1954, 11 × 8½ in., text pp. approx. 100, line drawings 88, coloured plates 88, 570 fr. belg.

This fine book, published in French, Dutch and German editions as well as English, is outstanding also in certain other respects.

The authors' aim was to include all varieties at present regarded in Belgium as of the highest commercial value; the list of 88 names is noteworthy not only for those included, but even more for those omitted. One of the objects is to encourage the planting of the most useful varieties and to help forward the reduction in the number of varieties now grown by the elimination of those of least value.

The list covers the whole field of our hardy fruits, except quinces and certain of the cane fruits. In number of varieties described tree fruits predominate considerably more than would be the case in any similar list made in this country; we find 23 apples, 17 plums, 13 pears, 10 peaches and 9 cherries; whilst of small fruits there are 4 strawberries, and but one each of gooseberry (Whinham's Industry), red currant (Fay's Prolific), black currant (Goliath), and raspberry (Preussen). Of the tree fruits, 11 are of English origin and 8 American; all the remainder are continental varieties, a few well known in this country, but the majority almost unknown.

With the exception of the Leopold III grape obtained as a mutation of Royal in 1937 there is an almost complete absence of newer varieties, the most recent introductions (according to the authors' notes on origin) being Preussen raspberry (1915), Golden Delicious apple (before 1916), and Early Laxton plum (early 20th century). This does not, of course, indicate that most of the new varieties are not already known in Belgium, but that they have not yet attained first rank in commercial plantings. If, as we may hope, further editions of this book are called for, several well-known varieties may be added and perhaps a few of the older ones discarded.

A colour plate and line drawings of each variety greatly enhance the value of the descriptions. Whilst the colours are not perfect, they are more nearly so than those in some recently published pomological works. The descriptions cover synonyms; origin; fruit characters; commercial value; cultural characteristics (including resistance to diseases and pests); and physiological characters (including notes on pollination). Under Fruit Characters, even vitamin C content is usually given.

Though this book may be of more value in this country to pomologists than to fruitgrowers, it is a very notable addition to present-day pomological literature.

N.H.G.

1139. Chamberlain, E. E.
Plant virus diseases in New Zealand.
Bull. D.S.I.R. N.Z. **108,** 1954, pp. 255, bibl. 6 pp., figs 185, paper cover 15s. or bound 20s.

Although issued as a bulletin this well printed and lavishly illustrated publication is essentially a book, in fact the one and only book, on the virus diseases of plants in New Zealand. Its primary purpose is to provide practical information on these diseases and their control for the benefit of growers, agricultural and horticultural instructors, and students. The impression gained is that the author has attained this objective in a most clear and orderly manner. The work is divided into three parts. Part 1 contains 3 chapters, one introductory, a second on techniques used in virus investigations and a third on methods used to control virus diseases. Part 2 consists of 8 chapters devoted to descriptions of virus diseases, and it is not without some feeling of dismay that one realizes that nearly all the crops mentioned are horticultural, including as they do tobacco, tomato, tree tomato, pea, bean, turnip, cauliflower, beetroot, lettuce, onion, rhubarb, strawberry, raspberry, apple, pear, plum, citrus, fig, tulip, lily, narcissus, iris, freesia, carnation, phormium and hop, and, in the suspected-only class, apricot and cherry. Part 3 contains the following useful appendices all relating to New Zealand: (1) List of plant viruses present with their natural hosts and methods of transmission; (2) list of virus disease synonyms; (3) list of plant virus hosts; (4) list of insect vectors of plant viruses; and (5) glossary. A short subject index is also provided.

1140. Genders, R.
Fruit all the year round.
Faber & Faber, London, 1953, 9 × 5½ in., pp. 246, illus., 16s.

Gardening books by Roy Genders enjoy wide popularity and the latest one, which deals with fruit, will probably be no exception. Beautifully produced and written in a pleasant style, it covers all the usual fruits with the addition of rhubarb, tomatoes, nuts and mushrooms and thus justifies the reference in its title to "all the year round". There is also a short chapter on preserving fruit. It aims at meeting the needs of English amateurs, smallholders and others producing commercially on a small scale, but the novice is likely to require rather more information and the expert may be irritated by the many inaccuracies in detail. The sixteen photographic plates add interest to the text. There is a useful bibliography and an adequate index. This is a book that will appeal especially to the "armchair" gardener. H.B.S.M.

1141. Hauman, L., and others.
Flore du Congo belge et du Ruanda-Urundi. Spermatophytes. V. **(Flora of the Belgian Congo and Ruanda-Urundi. Spermatophytes. V.)**
Institut national pour l'étude agronomique du Congo belge, Brussels, 1954, 10×6 in., pp. 377, illus., ordinary paper 300 fr. belg., special paper 500 fr. belg.

This volume is devoted to the Galegeae and Hedysareae tribes of the Papilionaceae and contains 27 full-page plates and 25 smaller illustrations.

1142. Heath, R. E.
Shrubs for the rock garden and alpine house.
Collingridge, London, 1954, 10×6½ in., pp. 191, illus., 42s.

Claiming to be the only one on the subject, this book deals exclusively with shrubs and conifers suitable for the rock garden or alpine house. Thus the plants selected for inclusion are either naturally dwarf or so slow growing as to amount to the same thing. The problem of what is a shrub and what is not is recognized, if not always solved to the satisfaction of everyone. For instance, it had never occurred to us that *Frankenia thymifolia* or *Dryas octopetala*, both small plants of prostrate habit and natives of this country, could be so classed, though we are not prepared to argue.

One of the attractive features of the book is the inclusion of many plants which will certainly be strange to most readers and to most nurserymen's catalogues too. The hunt will be up and the author has without doubt let himself in for a heavy post bag from frustrated enquirers. Many of the plants need winter protection and in such cases the fact is mentioned, but the statement that no dwarf *Fuchsia* is really hardy in this country except in the west is open to question. It may be true of those mentioned in this book but there are others; Tom Thumb, a most decorative, free-flowering variety, can always be trusted to reappear even though cut to the ground by frost, and so for that matter can *F. thompsoni*.

Apart from the descriptive list which, alphabetically arranged and with full cultural and other notes, occupies most of the book there are well written chapters on propagation and general treatment. Two useful pages give line drawings of all types of leaf forms and flower heads and the scientific term for each, so now the difference between a serrate and a dentate leaf or a corymb and a cyme need no longer corrugate the lower brows. This is really a most stimulating book and those who have any money left after paying for it will soon be on the move. We wish them all success in the chase. The plates are numerous and clear and picture many uncommon subjects. Type is large and readable and the whole book is worthily produced.
G.St.C.F.

1143. Hellyer, A. G. L.
Simple rose growing.
Collingridge, London, 1954, 7½×5 in., pp. 112, illus., 7s.

It is roses, roses, all the way in gardening circles just now. We are told they head the poll, whatever that means, as the world's most popular flower; more books are written about them than about any other plant and here comes the indefatigable Mr. Hellyer with one more. Things being as they are it can hardly claim to fill a gap in a literature in which no gap exists, but if such occurs on a gardening shelf this book is just the thing to stop it. It contains everything on the subject that all but the most esoteric can wish to know and being a small book has got it down succinctly. The mysteries of pruning are reduced to common sense; the art or craft of budding still remains an art (or craft) but is shown to be one easily acquired, and for those who can't be bothered there are other methods of propagation described. Pests and diseases are faithfully dealt with. If there seems to be nothing new under the sun in rose growing, except too many new varieties, there is still plenty of established practice to be acquired and this book will prove an excellent guide. There is a chapter on the selection of varieties which wags a long catalogic tail of appreciation but says no word on faults. Perhaps the best roses have not got any, being blessed above humans. It seems unlikely. In truth it is more instructive and more interesting to be told what is wrong than what is so obviously right. Sound judgement and a seeing eye are thereby encouraged. When everything in the garden is lovely it becomes a trifle dull. That cannot be said of this book which is lively in tone and well illustrated. G.St.C.F.

1144. Hellyer, A. G. L. (Editor).
Amateur gardening picture books. No. 1. Chrysanthemums. 2. Roses. 3. Tomatoes.
Collingridge, London, 1954, 8×6 in., each pp. 60, illus., 6s.

The aim of these booklets is to explain by means of photographs and drawings the various operations involved in the growing of certain popular plants, the cultivation of which, if perfection is desired, has almost assumed the nature of an exact science. Each book contains 120 illustrations supported by a brief explanatory text. The result is a series of useful compilations which should benefit others besides the beginners to whom they are dedicated. The stopping and timing of chrysanthemums and the pruning of roses, sources of perplexity to many, are but two examples where the explanations provided should do much to dispel the fog without imposing too great a mental strain on the aspirant. Each step from the cradle to the exhibition bench is made abundantly clear. It is to be hoped that this useful series will be extended. G.St.C.F.

1145. Jacks, G. V.
Soil.
Nelson & Sons, London, 1954, 8×5½ in., pp. 221, bibl. 60, illus., 12s. 6d.

The title aptly portrays the character of the book, simple and concise, yet meaningful. The author has access to much that has been written on the soil and he has made good use of it, not by producing an impressive tome only for book shelves, but by compiling an easy-to-read "compendium" on all aspects of the soil such as will fit one's pocket.

So much has already been written and said on the soil by empiricists which, unfortunately, the farmer reads and hears to a much greater extent than he does the statements of soil scientists, that there can be few farmers or growers who know whether their husbandry of the soil though based on "recommended" and "traditional" methods, is in fact scientifically sound and efficient. It is therefore refreshing and stimulating to find in this book oft repeated statements of dubious foundation, like "the earthworm is the farmer's best friend", questioned and a well reasoned discussion on the validity of the statements presented.

The tremendous influence that management and manuring can have on the soil is stressed and cannot fail to make the farmer aware that by these means he has control of the physical, chemical and biological properties of the soil to such an extent that a high level of soil fertility and abundant crop growth can be maintained indefinitely.

All growers and farmers will enjoy this book, for it is not without its humour, whilst the progressive agriculturist will find it of great help. J.E.G.

1146. JACOB, A.
Die Düngung der wichtigsten tropischen Kulturpflanzen. **(The manuring of the principal tropical cultivated plants.)**
Mittler & Sohn, Darmstadt, 1954, 8×5½ in., pp. 96, bibl. 286.

Among the crops discussed in this useful booklet are sugar cane, oil plants (olive, sesame and castor oil), fibre plants, tobacco, tea, coffee, cacao, rubber, palms (coconut, oil and date), fruits, vegetables, spices and drug plants. Research work is summarized throughout the text in italics, from the results of which the author draws conclusions on the optimal soil conditions for, and the nutrient requirements of, each crop. Recommended rates of application of the chief nutrients and a complete fertilizer are given in each case.

1147. JOHN INNES HORTICULTURAL INSTITUTION (LAWRENCE, W. J. C., Editor).
The fruit, the seed and the soil.
John Innes Leaflets, Nos. 1-9, 3rd edition, 1954, pp. 93, 5s.

No new leaflets have been added since the 2nd edition, but all have been brought up to date, and substantial additions made to No. 6, Growing tomatoes out of doors, and No. 8, Sweet corn in England.

1148. KESSLER, G. M.
Fruits, vegetables and flowers.
Burgess Publ. Co., Minneapolis, Minn., 1954, 8×5½ in., pp. 67, bibl. 7, $2.

This attractively produced little booklet, complete with bibliography and 11-page index, purports to give such basic knowledge of the structure and function of plant parts as will enable the hotelier to recognize quality in fresh fruits, vegetables and flowers and to maintain this quality throughout the processes of handling and temporary storage.

Though we are not going to risk it as a Christmas present to George, the barman at the Goat and Compasses, we feel he might be a changed man if he did read it in intervals between serving mild and bitters. The aim is optimistic, but the result is at least pleasant, though elementary, reading. D.A.

1149. S/L LANDBRUKETS EMBALLAGEFORRETNING OG GARTNERNES FELLESKJØP.
25Ar L.O.G. **(Twenty-five years of L.O.G.)**
S.L. Landbrukets Embellageforretning og Gartnernes Felleskjøp, Oslo, 1954, 8½×6 in., pp. 124, illus.

The jubilee publication of the Agricultural Packing Trade and the Horticultural Society of Norway includes the following articles of practical interest: Thorsrud, A., Glasshouse construction in Norway and other countries, pp. 46-51, illus. Hjeltnes, A., Glasshouses in Øverland, pp. 52-7, illus. Ramsfjell, T., Modern methods of disease control, pp. 58-62. Hansen, J. R., Soil sterilization by steam and chemicals, pp. 63-6, illus. Nordby, A., and Weseth, G., Mechanisation in horticulture, pp. 67-71, illus. Forfang, E. G., The raising of seedling plants, pp. 73-6.

1150. NOSTI NAVA, J.
Cacao, café y té. **(Cacao, coffee and tea.)**
Salvat Editores, S. A., Barcelona, 1953, 8½×6 in., pp. 687, bibl. 134, illus., Pesetas 275.

The author of this handbook is a former director of agriculture in the Spanish territories of the Gulf of Guinea and is now adviser on tropical crops to the Spanish Ministry of Agriculture. Cacao (368 pp.) and coffee (235 pp.) are discussed in much greater detail than tea (55 pp.) but the general layout is the same in each case. Each crop is treated under the following headings: history, origin and natural environment, anatomy, physiology, systematics, chemistry, establishment and maintenance of plantations, propagation, pruning, shading, manuring, diseases and pests, processing, grading, economics and trade. The bibliography ranges back to the 1880's and contains 134 references, namely, general 33, cacao 63, coffee 24 and tea 14. There is a 20-page index and 168 figures which include maps, building plans, clear line drawings and rather less clear photographs.

Two illustrations of the scope of the handbook may be given. The chapter on shading cacao (21 pp.) discusses the effects and objects of shading, the choice of shade trees in different parts of the world, the attributes of the ideal shade tree, temporary shade plants such as the banana, establishment and maintenance of shade trees, spacing, and selected temporary and permanent shade plants. The chapter on the propagation and pruning of coffee (30 pp.) deals with these subjects under the following headings: the seed, effect on germination of position, depth and date of sowing, sowing at stake and in the nursery, transplanting, propagation by cuttings and grafting; the natural branching habit of the coffee bush, sap circulation, tools, sequence of pruning operations, some operations common to all groups of coffee, timing of treatment, and the different methods of training and pruning the liberica, canephora and arabica groups.
J.D.

1151. DE ONG, E. R.
Insect, fungus and weed control.
Chemical Publishing Co., Inc., New York, and Thames & Hudson, London, 1953, 9×5½ in., pp. 400, bibls, illus., 52s. 6d.

This book attempts to cover all the fields (agricultural, medical, industrial) implied, and it is not surprising that it fails to do any of them justice, though 15 of the 17 chapters concern the agricultural field in the broadest sense. Moreover, there is scant reference to cultivation or biological control, pesticides being the method of choice, at least until "resistance" rears its ugly head.

The author rightly deplores the use of the word "pesticide" to cover toxicants used against arthropods, micro-organisms, rodents and weeds. But his alternative, "biocide", is far too wide; clearly, the hydrogen bomb is a very effective biocide. The fact of the matter is that there is no word, derived or likely to be derived, which will cover these four groups and, perhaps, a few more such as helminths, but *no other* groups. Short of coining a special word, it is surely better to promote a word from a sub-class to cover the whole class rather than to demote a word covering all the classes to a position denoting only one class. It will certainly be very difficult now to dislodge "pesticide" from the usage to which it has recently been elevated. One very good principle is advocated (p. 53): "It remains for the consumer to learn the chemical or common names of the pesticides which he wishes to use and be guided by that name rather than the brand name alone."

The author carries on the rather threadbare tradition of distinguishing "wetters" from "spreaders"; it is doubtful if any real purpose is served thereby.

The use of the prefix "fluo" for "fluoro" is very sore on English eyes and ears; it can only be justified if "chloro", "bromo" and "iodo" be curtailed also, and this is not done. Other aberrations include the use of "fungistatic" as a noun, and the confusion of "derivatives" with "constituents" and with "related compounds", while two paragraphs on the "effect of copper on plants" (p. 128) are largely incomprehensible. The author seems curiously ill-informed on systemic pesticides; quite unwarranted space is devoted (pp. 87-8) to a fluoro-compound, based on one reference, whereas Systox is dismissed in four lines (p. 107 and p. 377). Moreover, he seems blissfully ignorant that schradan is the same thing as OMPA (OPMA on p. 80); this illustrates the urgent need for international co-operation on "common names". There is also no justification for the statement (p. 79) that "more often the systemics are absorbed through the root"; soil application is seldom economic. The use of ordinary type for centre headings, italics for main side headings, and heavy type for subsidiary side headings must be deplored as contrary to practice and most confusing. The style is often jerky and sometimes repetitive. The printers have contrived many errors (at least 125 were detected by the reviewer), but they, the author and the "critics" thanked in the Preface must share the blame for the many inaccuracies and the absence of, or incorrect, punctuation which makes several passages ambiguous or misleading.

The directions are too sporadic and scrappy to allow this book to serve as a practical guide, while the inclusion of numerous bits of quantitative information from trials spoils the text as an exposition of principles. It is, of course, most unfortunate that a British firm should have "unloaded" so domestic an American book without even a reference to the fact that all gallonages are U.S. and not Imperial. The literature quoted is restricted almost entirely to U.S.A. periodicals; of over 600 references, only three being drawn from European literature, although the text covers many important pesticides originating in Europe. There are no references later than 1952 even in the Appendix entitled "Recent developments", and nothing is said about the origin of "recommended common names" even in the U.S.A. A.H.M.K.

1152. Schery, R. W.
Plants for man.
Allen & Unwin, Lond., 1954, 10×7 in., pp. 564, bibls, illus., 84s.

This book is the junior economic botanist's dream. In it he will find the many uses to which man has put the vegetable kingdom, pleasantly readable descriptions of the almost innumerable plants concerned and frequently some account of how they are made useful. The specialist in any one field will perhaps already have forgotten more than he is actually told on his particular subject, but he, too, will doubtless be glad of a handy source of information on closely related fields, in the mysteries of which he is not well versed. It should prove immensely valuable to the librarian faced with enquiries on all and sundry plants and it may even give hints to a planter unsatisfied with his own product, but wishful nevertheless to produce raw material for a particular purpose. Many a crossword maker will find it a delightful source of pitfalls for his clients and the dilettante will insist on its possession not only for light browsing but as a perpetual source of enjoyment. Further, and however deplorable it may sound, if anyone is forced to give a lecture at short notice on any one of the subjects discussed here, he cannot look for a more fruitful counsellor.

The plants considered are those from temperate and tropical regions alike, which have contributed to past and present civilization. In some few cases the chemist has now managed to produce a cheaper product more quickly and the commercial production of the plants in question is therefore on the wane. One and all, however, they have at some time been forced into the service of man, whether to paralyse an enemy, smiting him with arrows tipped with curare concocted from *Strychnos*, or to cheer a guest with the products of barley or the cocoa tree or to move in comfort over the surface of the world on processed latex.

Dull though it may be, it will perhaps be most useful to our readers to detail the headings under which the author gives his information. They are, in brief, after a short introduction, as follows: I. *Products from the plant cell wall* including sections on forests, timber, and fibres. II. *Cell exudates and extraction.* This is divided into sections devoted to latex products including rubber, pectins, gums, resins, etc., tannin and dye plants; essential oils; medicinals, insecticides and herbicides including tobacco and, rather unexpectedly, 2,4-D; vegetable oils, sugars and starches. III. *Plants and plant parts used primarily for food and beverage* divided into: food plants; cereals; other food seeds; vegetables, fruits; beverage plants; and lastly micro-organisms and miscellanea.

An adequate index is provided. Each chapter has a few references for those wishing to explore further in any direction. The print is large. The illustrations are very numerous, break any threatened monotony and are definitely informative. The spelling is American and we meet flavor, center, fiber and—logically but not too handsomely to the benighted, insular eye—accouterment. The style is clear, and the meaning unequivocal, so that the text continues to interest long after one might expect such a list of facts to pall. The price, though hard on the pocket, is not outrageous for an encyclopaedia. We are glad to have it, and recommend it unreservedly to all librarians. D.A.

1153. Smith, C. W.
Rose growing in South Africa.
Central News Agency, South Africa, 1953, 8½×5½ in., pp. 219, illus., 15s.

The first garden rose flowered in South Africa in 1659, an event of sufficient importance to be recorded in Van Riebeck's journal at the time. Now in South Africa roses are everywhere, contriving to flourish under a wide range of climatic conditions, even, if appropriate and quite simple precautions are taken, in the hotter and drier districts. In fact the rose has proved so adaptable that the author rather wonders why he is writing a book about it. Once started he finds plenty to say and that in an engaging and light-hearted manner which, while not disguising the solid information imparted, adds much to its digestibility. On certain matters of technique, no longer regarded as controversial in this country, argument in South Africa, perhaps on account of the more varying conditions, still rages "about it and about". One of these is planting depth, another is at what level to manure. These questions, still discussed with the heat commonly engendered when experts disagree, are here disposed of with logic backed by long experience. A chapter headed "Pray for these pests" has originality, for the pests are human! Here they are classified into a number of impolitely styled types and subjected to pungent comment from which the conscience-stricken reader, when he has done squirming, may learn quite a lot. The plates, some in colour, illustrate desirable varieties and there are line drawings of garden layout and of certain operations such as budding where the picture can tell the story more plainly than the written word. A very readable book and there is no need to go to South Africa to enjoy it. G.St.C.F.

1154. Smith, K. M., and Markham, R.
Mumps, measles and mosaics.
Collins, London, 1954, 8×5½ in., pp. xii +160, bibls, illus., 18s.

The inclusion of a volume devoted to *the virus*, as distinct from the *virus diseases*, in Messrs. Collins' New Naturalist series reflects the phenomenal advances in the new science of virology over the past thirty years, for until thus recently the term virus, as its etymology suggests, was little more than a convenient receptacle for the invisible, intangible, and unknowable, among pathogenic micro-organisms. Here, on the other hand, the virus itself is actually presented as an object for the field naturalist in a copiously illustrated book of some 160 pp., which manages with amazing success to avoid the over-simplification to be expected in a semi-popular work on a subject with such subtle and complex ramifications in the pure sciences. Although therefore providing no guide to virus diseases, this book can be confidently recommended both to the horticulturist as a fascinating introduction to one of his principal enemies, and to the virus-disease specialist as a stimulating review, in thirteen short chapters, of the present-day context of his studies.

From an introductory account (Chapter 1) of the emergence of research on the virus from the parent science of microbiology, the virus is treated in its manifold host relationships, namely, with insects, both as vectors and victims, with garden and farm plants, and with the higher animals including man (Chapters 2–7). A closer approach is then made to the nature of the elusive virus entity itself in Chapters 8–12 dealing with the causation of animal and plant tumours, with the isolation of viruses and the sizes and shapes of virus particles, and with the multiple approaches to the control problems. Finally (Chapter 13) the naturalist is encouraged to apply this book-knowledge in the practice of simple techniques for testing the possible virus origin of some of his garden failures. The book is generously illustrated with photographs and line drawings, the former including reproductions of superb electron-micrographs of well-known viruses. A glossary, a key table for diagnosing common plant-viruses, and an index are provided. R.V.H.

Annuals and reports.

1155. Algérie, Gouvernement Général.
Rapport du Conseil de l'Expérimentation et des Recherches agronomiques pour 1953. **(Report of the Council for Experimentation and Agronomic Research for 1953),** Algiers, 1954, pp. 366.

Soils: krilium studies; organic manuring of tobacco; fertilizing tobacco, citrus, date palm; irrigation of citrus. *Vine:* variety collections, rootstock tolerance to lime, bench grafting, selection and pruning studies on Chasselas, foliar diagnosis. *Date palm:* pollen studies. *Fig:* caprification, drying. *Olive:* varietal and flowering studies. *Almond:* varietal sterility. *Japanese plum:* pruning. *Pecan:* varietal selection and cultural technique. *Citrus:* clonal selection, rootstocks, maturity determination. *Flower crops:* rose rootstocks, bulbs. *Market garden crops:* tomato. *Phytohormones:* studies on root promotion, parthenocarpy, dormancy, regulation of fruit maturity, reduction of the phytotoxic action of antiparasitic substances, herbicides. *Plant pathology:* downy mildew, powdery mildew and grey mould of vine; fruit fly, bud mite and orangeworm on citrus; scab on medlar. [See also separate abstracts.]

1156. Argentina.
Dirección General de Fomento Agrícola. Memoria año 1952. **(Annual Report of the Department of Agricultural Development for 1952.)**
Bol. Prod. Foment. agric., 1953, **5** (43/48), pp. 184.

The following crops were the subject of research: tobacco; castor bean; fibre plants, namely *Cannabis sativa*, ramie, *Agave* spp., indigenous bromeliaceous species and *Fourcroya cabuya integra*; sugar cane; guayule; *Ocimum kilimandscharicum* and *Rosmarinus officinalis*; hops; tea; coffee.

1157. Argentina.
Progreso de las investigaciones agrícolas durante el año 1953. **(Progress in agricultural research during 1953.)**
Idia, 1954, Nos. 73/75, pp. 159.

This annual report of the Department of Agricultural Research mentions the following crops of horticultural interest: sugar cane, tobacco, vegetables, mint, yerba maté, mushrooms, kok-saghyz, peach, olive, orchids, hemp, safflower, citrus, vine, cherry, almond, apricot, apple, strawberry, gooseberry, hazel nut, plum, fig, pear, quince, poppy, hops, coffee, tea and date palm.

1158. BRITISH COLUMBIA.
48th Annual Report of the Department of Agriculture, British Columbia 1953, 1954, pp. 211.

Horticultural Branch (pp. 28-57): Fruit, vegetable and other crop yield records; tomato and lima bean variety trials; blossom thinning of apples, peaches and prunes; fertilizer trials on prunes, vines, strawberries and some vegetables; weed control in greenhouse soils, nursery stock, strawberries and vegetables; control of Fe deficiencies by sprays; new varieties of strawberry, raspberry and loganberry. *Plant Pathology Branch* (pp. 62-6): Apple scab control; physiological disorders of fruit trees; control of yellow rust on raspberry; red stele of strawberry. *Entomology* (pp. 67-73): Incidence and control of fruit, vegetable and flower pests.

1159. CEYLON (JOACHIM, A. W. R.).
Administration Report of the Director of Agriculture for 1953, Part IV—Education, Science and Art (C), 1954, pp. 112, Rs. 3.35.

This report includes information on the following, among other, research activities: *Tea Research Institute*. Control of blister blight and other diseases, vegetative propagation, green manures, herbicides, manuring, trace element nutrition, technology. *Rubber Research Institute*. Fungicide trials, manuring, weed and animal control, spacing, breeding, yield stimulation, rainguards. *Coconut Research Institute*. Selection, manuring, mineral nutrition including magnesium, nut storage, grazing. *Division of Botany*. *Cymbopogon* spp. manurial trials. *Division of Sugarcane Research*. Variety and time-of-planting trials. *Division of Entomology*. Chilli leaf curl transmission by *Bemisia inconspicua*; cacao pest and disease transmission studies including *Helopeltis antonii*, transmission of cacao "oak leaf" virus by *Pseudococcus lilacinus* and *P. citri*, biological control of these mealybugs and *Ferrisia virgata*; pineapple wilt and *Pseudococcus brevipes*; biological control of *Nephantis serinopa*. *Division of Plant Pathology*. Chilli leaf curl control. *Division of Horticulture*. Cacao propagation by stem and single-leaf cuttings, rooted cutting trials, selection, introductions, pollination, stock-scion trial; citrus stock-scion trial, seed viability; seedless guava. *Tobacco Division*. Economics, trials with boron and spacing, topping, rotation and cigar variety trials.

1160. CORNELL.
66th Annual Report Cornell University Agricultural Experiment Station for the year 1952-53, 1954, pp. 115.

Research projects listed (p. 62 onwards) include: *Agricultural economics:* Economic problems on fruit farms. *Botany:* Study of economic plants; germination of vanilla seed; botany of rhubarb; induced tetraploidy in cantaloupes; peppermint. *Entomology:* Control of apple pests; pests of in- and outdoor flower crops; pests of nursery crops and woody ornamentals; pollinating insects; control of carrot rust fly; spray deposits on apple leaves. *Floriculture and ornamental horticulture:* Day-length and temperature studies on chrysanthemum, orchid and gloxinia; cold storage of tulip bulbs; controlled production of carnations; induced early maturity, prolonged dormancy and defoliation before and after digging of nursery stock; variety testing and breeding; weed control. *Plant breeding:* Vegetable breeding for disease resistance. *Plant pathology:* Nutritional diseases of apple; diseases of fruits, vegetables, ornamentals and their control; viruses of fruit trees; susceptibility of rootstocks to diseases. *Pomology:* Soil factors associated with differences in yield and behaviour of important fruit crops; nutrition; cold hardiness; blossom thinning; fruit drop; fruit storage. *Vegetable crops:* Breeding and improvement; nutrition; irrigation.

1161. DEPARTMENT OF AGRICULTURE FOR SCOTLAND.
Agricultural Statistics, 1952, Scotland.
H.M. Stationery Office, 1954, pp. 99, 4s. 6d.

Part I of this bulletin deals with acreages, yields and production, and Part II with prices, output and value, of agricultural produce, including fruit and vegetables. [See also *H.A.*, 23: 3663.]

1162. D.S.I.R., LONDON.
Food Investigation 1953, being *Report of the Food Investigation Board with the Report of the Director of Food Investigation for the year 1953*, H.M. Stationery Office, London, 1954, pp. 56, 3s. 6d.

The report includes accounts of work in progress at the Low Temperature Research Station, Cambridge, at Ditton Laboratory, and at Covent Garden Laboratory. The following lines of research are reported: on plant tissues and products, including enzymic and non-enzymic browning, phenolic constituents of plants and the metabolism of peas; the biochemistry of stored apples; scald and other physiological diseases of apples; lenticel rotting; the effect of cultural conditions on storage life; storage of broccoli, soft fruits and plums; vegetable washing; and biological engineering.

1163. FARM IMPLEMENT AND MACHINERY REVIEW.
Farm implement buyers' guide No. VIII, 1954/55.
Roger Wilding, Ltd., 9 The Broadway, Woodford Green, Essex, 1954, 10½×8 in., pp. 320, 5s.

It is by no means uncommon for this Bureau to receive enquiries for the names of manufacturers of various types of horticultural machinery and equipment, and we have already had reason to be thankful for the existence of this guide. Whether your needs and your pocket run to the purchase of a large tractor or a mist blower or to more humble items such as a push hoe or a bird scarer you will find lists of British manufacturers most of whom will doubtless be delighted to hear from you. The word "most" is used advisedly, because the guide is not entirely without its errors. Nor does it contain the name of every maker of every item of equipment listed. These small defects apart, it should be of great assistance to many of our readers and especially those situated in territories so far flung as not yet to have attracted the attention of energetic and persuasive agents. G.K.A.

1164. Indian Council of Agricultural Research.
Annual Report of the Indian Council of Agricultural Research for 1951-52.
Government of India Press, Simla, 1954, pp. 181, Rs. 3/2/– or 5s.

The report includes brief accounts of research work under the following headings: *Other crops:* Cardamoms, cloves, turmeric, coriander, ginger, chilli, pepper. *Medicinal plants:* Environmental requirements of opium-producing plants. *Horticulture:* Mango, citrus, banana, apple, custard apple, vine. *Vegetables. Botany and Plant Physiology:* Cell permeability in embryos of desiccated, vernalized and untreated mustard seeds. Effect of chilling and desiccation on isolated mustard embryos in different culture media. Presoaking crop seeds in nutrient salts to improve yields and prevent nutrient deficiencies. *Pests and diseases:* Mango hopper and termite control. Studies on virus diseases in *Datura*, egg plant, *Vinca rosea*, papaw and cardamom.

1165. I.N.E.A.C.
Rapport annuel pour l'Exercice 1953. **(Report of the work of the I.N.E.A.C. Stations, 1953.)**
Publ. hors Sér. Inst. nat. Ét. agron. Congo belge, Brussels, 1954, pp. 507, 160 fr. belg.

The volume includes reports from Yangambi research station and various substations. The Yangambi report covers the following subjects: *Oil palm:* breeding; cultural experiments on spacing, intercropping, fertilizers, disease control, germination; multiplication and seed supply. *Hevea:* selection, including preselection and progeny trials; cultural experiments, including clearing and layout of plantations, replanting, yields and harvesting, disease control, stock-scion effects, standardization of rootstocks based on vigour and Testatex tests, precoagulation. *Coffee:* breeding and selection, including progeny trials and adaptation; cultural experiments, including spacing, cover and green manure crops, shade and manuring; research, including seedlings *vs.* grafted plants and seedlings *vs.* cuttings trials, floral biology, phenology, techniques for propagation by cuttings, pest and disease control. *Cacao:* breeding and selection; cultural experiments on plantation clearing and density, temporary and permanent shade, floral biology, and phenology. *Food Plant Division:* banana, sugar cane. *Phytopathology and Entomology:* pests and diseases of hevea and citrus. *Genetics:* banana, oil palm, coffee and hevea. *Plant physiology:* mineral nutrition of oil palms, cacao and coffee. The principal horticultural crops mentioned in the reports of the research centres in the different geographical regions of the Congo are: *Lower Congo:* citrus, avocado, mango, pineapple, banana, strawberry, tung, sisal, *Fourcroya* spp., hevea and cacao. *Central Congo:* hevea, oil palm and coffee. *North:* banana, vegetables and coffee. *South:* beans, plantain, oil palm. *Katanga:* apple, avocado, litchi, peach, citrus and vegetables. *Kivu:* coffee, tung, tea, cinchona, pyrethrum, ramie, vetiver, opium poppy and beans. *Ituri:* coffee, cinchona, tea, tobacco, beans and mulberry. *Ruanda-Urundi:* coffee, cinchona, castor, peas and beans.

1166. Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica.
Annual Report of the Inter-American Institute of Agricultural Sciences for the year 1952, 1954, pp. 160.

Coffee: Breeding and selection. Cultural practices: deep digging (5 in.) *vs.* shallow digging *vs.* mulching; spacing; bourbon *vs.* typica; storage of budwood. Physiological and ecological studies: mineral nutrition including 6 minor elements, lime, sulphur and magnesium; "cafe macho" plants characterized by very high Mn and low Zn; stomatal movement. Disease control: seedling and nursery diseases; good control of *Colletotrichum* and *Cercospora* on seedlings with SR-406 and Fermate. Insect control (coffee root mealy bugs, *Geococcus coffeae* and *Neorhizoecus coffeae*): effect on infested plants, varietal resistance, control with dieldrin, chlordane, aldrin and BHC. *Vegetables:* breeding and variety testing. *Sugar cane:* yield trials, ratoon growth, flowering. *Fibre crops:* Manila hemp. *Chemicals in agriculture:* Herbicide studies in coffee and sugar cane; insecticide studies, including D-D against coffee root mealybugs, and sticker tests on banana leaves; growth regulating materials for pineapple flowering, coffee defoliation, sugar cane setts, coffee pre-harvest fruit drop; soil fumigation in relation to root-knot nematodes on tomato and okra, coffee nurseries, tobacco seedbed diseases, nematodes on manila hemp, banana panama disease, sugar cane growth, and cacao seedbeds. *Inter-American Cacao Center.* Propagation and nursery practice. Physiological and ecological studies: effect of shade on seedlings, hormone sprays to increase production, mineral nutrition, rooting of cuttings, growth and flowering. Disease control: diseases of cuttings and leaves in the propagator, and black pod, *Phytophthora palmivora.*

1167. Long Ashton.
Annual Report of the Agricultural and Horticultural Research Station, Long Ashton, Bristol, 1953, 1954, pp. 217, bibls, illus.

Following an introduction by the Director an account is given of the celebrations marking the Jubilee of the foundation of the National Fruit and Cider Institute in 1903. The remainder of the report, as in the past, consists of separate papers, abstracts of which will be found in earlier sections.

1168. New Zealand, Department of Agriculture.
Annual Report of the Director-General of Agriculture, N.Z., for the year ended 31 March, 1954, Wellington, 1954, pp. 167.

The report of the Horticulture Division covers pp. 118-142, and includes that on beekeeping. The first part is concerned with notes on production, pests and diseases, and various trials with hard and soft fruits, citrus, sub-tropical fruits, hops, tobacco and vegetables. Reports from the horticultural station at Te Kauwhata concern viticultural work and include: promising control of *Phylloxera vastatrix* on vine roots was obtained by DDT and by lindane emulsions; satisfactory weed control for 6–7 weeks was given by an application of a petroleum weedkiller; SR406 and Dithane 78 gave control of powdery mildew but not of black spot; promising results have also been obtained in the control of black spot by thiram, and in fruit setting with hormones. Building at Levin Horticultural Research Station has continued, and cultural trials are being carried out there on soft fruits, flowers and vegetables. Bulb research at Invermay has been discontinued owing to lack of support. Other experimental areas administered by the Division are Kerikeri (citrus rootstock and variety trials planted out in 1951–52) and Avondale (vegetable trials), both in the Auckland area.

1169. NEW ZEALAND, D.S.I.R.
28th Annual Report of the Department of Scientific and Industrial Research, New Zealand, for 1953-54, Wellington, 1954, pp. 68, 2s. 6d.

In this annual report a substantial departure from precedent has been made. The technical reports of the various branches have been replaced by a list of the major projects under way in each branch, together with a list of papers published during the year. *Fruit Research Station:* The many projects include: testing growth-inhibitors to encourage early fruiting in excessively vigorous trees; testing new devices for frost control; measurement of temperatures dangerous to various fruits; the effect of chemical thinning on storage quality; trial of 730 apple varieties; rootstock investigations; methods of raising apricot seedlings and ways of improving bud-take in apricots on apricot rootstocks; methods of pruning very vigorous and weak growing apple trees; studies on the effect of locality on fruit shape, colour, and period of ripening; and identification of virus diseases in pome, stone, and citrus fruits. *Hop research:* Breeding of new varieties resistant to root rot, germination of hop seed, techniques of testing for susceptibility to root rot at the seedling stage and of rapid propagation of promising seedlings. *Plant Disease Division:* Studies on pests and diseases of many horticultural crops; plant therapeutants. *Tobacco Research:* Seed treatment for disease control; use of soil conditioners in seedling beds; breeding; fertilizers; variety trials; curing; and control of wireworms with soil insecticides. *Cawthron Institute:* Minor elements in the nutrition of hops and tobacco; development of sugars and resins in hop cones; fruit research; and tomato investigations.

1170. ROYAL HORTICULTURAL SOCIETY.
The Fruit Year Book 1955, No. 8.
R.H.S., Vincent Square, London, 1954, 9×6 in., pp. 142, illus., 10s.

In this edition of *The Fruit Year Book*, 3 further papers presented at the Thirteenth International Horticultural Congress are published with additions, on the changes in orchard fauna during the present century [see *H.A.*, 23: 465], on orchard soil management [see *H.A.*, 23: 188], and on the maintenance of healthy fruit clones [see *H.A.*, 23: 398]. Amongst others there are articles on early English fruit books, apricot culture, apple thinning, fruit drop in apples, and important stone fruits in New Zealand. Accounts are given of fruit growing under high rainfall conditions, in an amateur's garden in Middlesex, in a Cambridge college garden, and in New South Wales. Reports of a meeting of the Fruit Group Brains Trust and a discussion on the arrangement of fruit in small gardens will be of particular interest to amateurs.

1171. ROYAL TROPICAL INSTITUTE, AMSTERDAM.
Inlichtingen en Onderzoekingen van de Afdeling Tropische Producten in 1953. **(Information and research in 1953 of the Tropical Products' Department.)** [English summary 8 pp.], 1954, pp. 82, bibls, illus., f. 3.50.

Among many activities mention may be made of: *Essential oils:* analysis of expressed lime oil from Trinidad. *Insecticides:* in Indonesia derris is being reintroduced for the control of *Helopeltis* on tea and cacao, as the pest has become resistant to DDT. *Oils and fats:* the average composition of desiccated coconut is given; the moisture content and the acidity of the oil give some indication of rancidity.

1172. SOCIETY OF CHEMICAL INDUSTRY (POLLARD, A. G., AND OTHERS).
Agriculture and horticulture.
Reps Progr. appl. Chem. 1953, [1954], **38**: 587-615, bibls numerous.

The following sections of this review are of horticultural interest: *Soil conditioners* (A. H. Cornfield), pp. 588-92, bibl. 33: Recent work with conditioners, particularly krilium, and their effect on soil structure and plant growth are discussed. *Fertilizers* (D. P. Hopkins), pp. 592-8, bibl. 31: Foliar application of trace elements to citrus is reported to have notably increased insect populations. When N spray-solutions are composed of ammonium nitrate and urea, twice as much N can be applied without crop injury as when either substance is used alone. *Analysis of agricultural and horticultural materials* (J. H. Hamence), pp. 611-15, bibl. 42: Methods of determining the mineral constituents of plant tissues and the chromatographic separation and identification of growth substances and insecticides are reviewed.

1173. SOUTHERN RHODESIA.
Annual Report of the Director of Research and Specialist Services for the year ending 30th September, 1953, 1954, pp. 54.

Salisbury Experiment Station: Cuban kenaf produced more fibre than Egyptian or Brazilian strains. *Horticulture:* a sport of Versfeld's apple, which ripens 6 weeks earlier than normal, has been found. *Entomology:* the persistence of parathion used in the control of mango scale (*Leucaspis indica*) was superior to that of white oil emulsion. *Botany:* a vine and root rot of velvet bean (*Mucuna deeringiana*) caused by a *Phytophthora* sp.

1174. SOUTHERN RHODESIA (BATES, G. R.).
Report of the Chief Botanist and Plant Pathologist for the year ending 30th September, 1953.
Rhod. agric. J., 1954, **51**: 359-70.

Botany. Effective control of *Acanthospermum hispidum* is obtained with 0·1% 2,4-D amine salt at 100 gal. per acre. *Plant pathology*. Tobacco, peas, sugar cane. *Seed testing*. Lettuce: studies on imported lettuce seed showed that white-seeded varieties were generally superior to black-seeded in keeping quality. Tobacco: in tests on the effect of stage of maturity of seed capsules on germination, seed from dry brown capsules showed the highest germination rate.

1175. U.S. Department of Agriculture (Hilbert, G. E.).
Report of the Chief of the Bureau of Agricultural and Industrial Chemistry.
Rep. Administ. agric. Res. U.S. Dep. Agric. 1952-53, 1954, pp. 75, 25 c.

Research projects reported include: the removal of thrips from harvested raspberries; sugar cane bagasse for manufacture of shipping containers; new browning compound isolated from fruit [see separate abstract]; studies on gibberellin, a plant growth regulator derived from the fungus *Gibberella fujikuroi*.

1176. Zanzibar.
Annual Report of the Zanzibar Department of Agriculture 1953, 1954, pp. 29, sh. 2.

Cloves. The Clove Research Scheme finally closed in March. Although the fungus *Valsa eugeniae* is undoubtedly a parasite on the roots and branches of clove trees, and appears to be present in all trees which have recently been killed by sudden-death, it is often prevalent in areas where there is no evidence of sudden-death. The Department of Agriculture has, however, framed a programme of investigations on the assumption that the cause of the disease is an organism parasitic on the roots. *Coconuts.* In experiments on the direct control of *Theraptus* sp., the chief cause of premature nut fall and the gummy lesions and distortion of mature nuts, the most useful insecticide so far tested is 10 DRDK which consists of 10% DDT and 1% resin in a mixture of dieselene and kerosene; mist spraying gives more promise than aerial or hand spraying. Experiments are also in progress on the indirect control of *Theraptus* by encouraging the predatory *Oecophylla* ants.

New periodicals.

1177. Consejo Superior de Investigaciones Científicas.
Archivos del Instituto de Aclimatación
[*Arch. Inst. Aclimat.*], 1953, Vol. I, pp. 177, illus., Imprenta Guía, Alta de la Iglesia 37, Almeria, Spain.

This new periodical is the journal of the Almeria Institute of Acclimatization which was founded in 1947 for the study of scientific problems, especially the introduction of dry-zone plants, and now consists of 5 sections, namely, Botany, Experimentation, Fauna, Microbiology and Chemistry. This first issue is devoted to the work of the Fauna and Chemistry sections. It includes a paper on systemic insecticides.

1178. Instituto Interamericano de Ciencias Agrícolas.
Suplemento Bibliográfico de Turrialba
[*Supl. bibl. Turrialba*], 1954, No. 1, pp. 87 (one-sided), U.S. $ 3.00 p.a.

This quarterly Bibliographical Supplement to the journal *Turrialba* consists of 3 parts: (1) a series of abstracts of selected papers on agriculture from the world's scientific agricultural journals; (2) a briefly annotated bibliography of all the papers recently published in the principal Latin American scientific agricultural reviews; and (3) a selected list, classified by subjects, of the books and pamphlets acquired by the Institute Library. Prominence is given to cacao, coffee and sugar cane. The pages are printed on one side only so that the abstracts, which are all the same size, can be cut out for carding.

1179. Kanagawa Agricultural Experiment Station.
Bulletin of the Horticultural Section of the Kanagawa Agricultural Experiment Station [*Bull. hort. Sect.* Kanagawa agric. Exp. Stat.*], No. 1, 1953, pp. 86, illus., from Horticultural Section, Kanagawa Agricultural Experiment Station, Ninomiya, Kanagawa, Japan.

The first issue of this new annual research journal contains 13 papers, namely, 4 on oranges (storage and transport), 2 each on vegetables (breeding and culture), peaches (bacterial spot and nutrition), and pears (pollination and rootstocks), and one each on strawberries (flower bud differentiation), melons (pruning) and carnations (cuttings). [Unfortunately, though the titles whet the appetite, most of the English summaries are so unintelligible as to fail to satisfy it.]

1180. Muséum National d'Histoire Naturelle.
Journal d'Agriculture tropicale et de Botanique appliquée [*J. Agric. trop. Bot. appl.*], 1954, Vol. 1, No. 1/4, pp. 128, illus., Muséum national d'Histoire naturelle, 57 rue Cuvier, Paris Vme, foreign subscription for 1954 2,000 fr.

This new illustrated monthly journal, edited by MM. P. Vayssière and R. Portères, is designed to replace Professor A. Chevalier's *Revue internationale de Botanique appliquée et d'Agriculture tropicale* which ceased publication at the end of 1953. The editorial committee proposes to give it the same character as its predecessor but the alteration in the title is doubtless significant. The first issue includes 3 papers abstracted separately in the tropical section of this number of *H.A.*, namely, cinchona growing and quinine production in the French Cameroons, micro-tests of fungicides for the control of *Cercospora musae* on bananas in Guadeloupe, and present problems of coffee growing in Africa.

Noted.

1181.

a Cameroons Development Corporation.
Annual Report of the Cameroons Development Corporation for 1953, 1954, pp. 33, illus.
Including progress with plantation crops.

b Centre de Recherches Agronomiques de Bambey.
Annales du Centre de Recherches Agronomiques de Bambey au Sénégal. Année 1953.
(Annals of the Bambey Agronomic Research Centre, 1953.)
Bull. agron. Minist. France d'Outre Mer **11**, 1954, pp. 216, illus.
Including a paper on castor [see abstract 786.]

---

* The second number is designated *Bull. hort. Branch.*

c CYPRUS (HIRST, H.).
Annual Report, Department of Agriculture, Cyprus, for 1953, Nicosia, 1954, pp. 18, 2s.

d INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE.
Rapport Annuel 1951. **(Annual Report of the [French] National Institute for Agronomic Research for 1951)**, 1954, pp. 250.
See also *H.A.*, 23: 3671.

e KENYA.
Annual Report of the Kenya Department of Agriculture for 1953, Vol. I, 1954, pp. 65, 3s.
See also *H.A.*, 24: 3303.

f "DE LANGE OSSEKAMPEN", WAGENINGEN.
Jaarverslag 1952, Centrale Bemestingsproefveld voor de Fruitteelt "De Lange Ossekampen", Wageningen. **(Annual Report "De Lange Ossekampen" Central Manurial Trial Ground for Fruit Culture, Wageningen, for 1952)**, pp. 108, illus.
Manurial trials with apples, pears and red currants.

g NEBRASKA.
Sixty-seventh Annual Report of the Nebraska Agricultural Experiment Station for 1953, 1954, pp. 16.
Projects and publications listed.

h NEW JERSEY.
Seventy-third Annual Report of the New Jersey Agricultural Experiment Station 1951-1952, pp. 28 [received 1954].

i NEW JERSEY.
Seventy-fourth Annual Report of the New Jersey Agricultural Experiment Station 1952-1953, 1954, pp. 31.

j NYASALAND PROTECTORATE.
Annual Report of the Nyasaland Department of Agriculture for 1953, Part I, 1954, pp.28, illus., 2s. 6d.

k SARAWAK.
Annual Report of Sarawak Department of Agriculture for 1953, 1954, Government Printer, Kuching, pp. 21.

l SINGAPORE (HENDERSON, M. R.).
Annual Report Botanic Gardens Department for 1953, 1954, pp. 7, illus., 50 cents.
See abstract 851.